ROCEEDINGS OF THE 1950 MEETING

Associates:

FOOD and CONTAINER INSTITUTE, Inc.

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15 JUN. 1953		

PROCEEDINGS OF THE 1950 MEETING

Associates, Food and Container Institute, Inc.

25, 26 APRIL 1950

Fort Knox and Louisville, Kentucky

ASSOCIATES, FOOD AND CONTAINER INSTITUTE, INC.
1849 West Pershing Road
Chicago 9, Illinois

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1950-1951

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For 3 Years

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Vice Chairman: Mr. Thomas M. Rector (deceased), Vice President, General Foods Corporation

President: Dr. Berton S. Clark, Director of Research, American Can Co.

Executive Vice President: Mr. Harry J. Williams, Vice President, Wilson & Co., Inc.

Vice President in charge of the Activities Committee: Dr. W. R. Johnston, Vice President, Standard Brands Incorporated

Treasurer: Mr. J. R. Bishop, Vice President, International Minerals & Chemical Co.

Secretary: Col. Rohland A. Isker

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Vice Chairman: Dr. Roy C. Newton, Vice President, Swift & Company

President: Dr. Berton S. Clark, Director of Research, American Can Co.

Vice President: Mr. Thomas M. Rector (deceased), Vice President, General Foods Corporation

Treasurer: Mr. Victor Conquest, Director of Research, Armour & Co.

1947-1948

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Mr. Victor Conquest, Director of Research, Armour & Company

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*Chairman of the Interim Board, 1947-48.

†Chairman of the Board of the Associates, 1948-49.

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MR. THOMAS M. RECTOR (deceased), Vice President, General Foods Corporation

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THE DEVELOPMENT OF NEW CANNED MEATS

G. C. HOGLUND, Wilson & Co., Inc.

CANNED STERILE HAM

J. N. CZARNECKI, Griffith Laboratories

MILD-FLAVORED HAM AND BACON

W. J. SHANNON, Oscar Mayer & Co.

DEHYDRATED MEATS

G. A. CRAPPLE, Wilson & Co., Inc.

CANNED MEATS

H. R. KRAYBILL, American Meat Institute

‡Chairman of the Board of the Associates, 1949-50.

MAXIMUM TEMPERATURE REGISTERING INDICATOR FOR FROZEN MEATS

R. G. Pollock, National Live Stock and Meat Board

PREFABRICATED FROZEN TURKEY

M. H. Taras, C. A. Swanson & Sons

FROZEN LAMB AND PORK

R. G. Pollock, National Live Stock and Meat Board

DEHYDRATED EGGS

H. M. Slosberg, Henningsen-Lamesa, Inc.

CANNED SEA FOOD PRODUCTS

C. Triggs, Fish Distributors Cooperative Association

CEREAL AND BAKED PRODUCTS

John S. Andrews, General Mills, Inc.

Theodore Soloski, Cereal and Baked Products Division, QM F&CI

CANNED PUDDINGS

A. D. Kennedy, Crosse & Blackwell
J. A. d'Avi, Hills Bros. Company
Dougald MacDonald, Burnham & Morrill
J. T. Knowles, Libby, McNeill and Libby
Harry J. Alleman, Kroger Grocery & Baking Company

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John S. Andrews, General Mills, Inc.
Betty Sullivan, Russell-Miller Milling Company
F. N. Peters, Quaker Oats Company
C. G. Harrel, Pillsbury Mills, Inc.
David Carpenter, American Home Foods, Inc.
Paul Holton, The Holton Company
Robert Hudson, General Foods, Inc.
W. F. Geddes, University of Minnesota

DAIRY PRODUCTS

R. J. Remaley, Kraft Foods Company

C. A. Vorhes, Dairy Products Division, QM F&CI

CANNED OLEOMARGARINE

O. J. Fiala, Durkee Famous Foods
A. Van de Erve, Armour Laboratories
George A. Crapple, Wilson & Co., Inc.
L. O. Brown, Swift and Company
Robert A. Wait, The Procter & Gamble Co.

NON-FAT DRY MILK SOLIDS

A. O. Dahlberg, Consolidated Dairy Products Company
A. H. Johnson, National Dairy Products Company
A. P. Stewart, Golden State Company
Raymond Powers, The Borden Company

DEHYDRATED SPREADS FOR BREAD

R. J. Remaley, Kraft Foods Company
Arthur M. Swanson, University of Wisconsin

EVAPORATED MILK

James F. Hale, The Borden Company
W. F. Widdifield, Consolidated Badger
H. L. Rasmussen, Midland Cooperative
E. A. Louder, Pet Milk Company
J. M. Trimble, Indiana Condensed Milk Company
E. H. Parfitt, Evaporated Milk Association
F. E. Rice, Evaporated Milk Association
H. L. Sipple, Evaporated Milk Association
Bert Otting, Carnation Milk Company
Louis Arrigoni, Consolidated Dairy Products
J. A. Striffler, The Nestlé Company
W. J. Ketcham, Rochester Dairy Cooperative
L. T. Davis, White House Evaporated Milk Company
Grant Hartman, White House Evaporated Milk Company

DRY WHOLE MILK

E. M. Barker, Rochester Dairy Cooperative
A. P. Stewart, Golden State Company
R. W. Titus, The Nestlé Company
Raymond Powers, The Borden Company
J. D. Ingle, Swift and Company
E. A. Louder, Pet Milk Company
B. W. Fairbanks, American Dry Milk Institute

FRUIT AND VEGETABLE PRODUCTS

J. T. Knowles, Libby, McNeill & Libby
J. R. Wagner, Fruit and Vegetable Division, QM F&CI

CANNED SOUP

Joseph Hanley, Libby, McNeill & Libby
Robert Murray, Continental Can Company
L. G. Germain, American Can Company
V. O. Wodicka, Libby, McNeill & Libby

DEHYDRATION

A. N. Prater, Gentry, Incorporated
M. S. Burns, California Vegetable Concentrates
Ross Crane, Cal Compack Foods, Inc.
Ray Kueneman, J. R. Simplot Company
Robert Stephenson, Basic Vegetable Products, Inc.

GENERAL PRODUCTS

JAMES F. HALE, The Borden Company
K. T. FARRELL, General Products Division, QM F&CI

SOLUBLE COFFEE

LAWRENCE ATKIN, Standard Brands Inc.
D. E. MOOK, The Borden Company
FRANK LANIGAN, The Nestlé Company
R. H. WALTERS, General Foods Corporation

CHOCOLATE

N. W. KEMPF, Walter Baker and Company, Division of General Foods
R. F. KORFHAGE, Peter, Cailler, Kohler, Inc.
E. W. MEYERS, Hershey Chocolate Corporation
W. T. CLARKE, Rockwood and Company

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B. W. CLARKE, Crosse & Blackwell
W. L. WALDE, National Preservers' Association
HARRY HIRSCH, Glaser Crandall Company
FREDERICK JOHNSON, The J. M. Smucker Company
E. E. MESCHTER, The American Preserve Company

SOLUBLE TEA

LAWRENCE ATKIN, Standard Brands Inc.
D. E. MOOK, The Borden Company

PROTEIN HYDROLYSATES

LAWRENCE ATKIN, Standard Brands Inc.
W. R. EICHENBERGER, A. E. Staley Mfg. Co.
S. L. GALVIN, The Huron Milling Company
R. J. REMALEY, Kraft Foods Company

CONTAINERS

SUBSISTENCE PACKAGING AND PACKING

L. W. ELDER, General Foods Corporation
F. J. RUBINATE, Subsistence Packaging and Packing Division, QM F&CI

GENERAL SUPPLIES, CLOTHING AND EQUIPAGE

R. R. MELSON, The Marathon Corporation
F. W. STENZE, General Supplies, Clothing and Equipage Division, QM F&CI

PRESERVATION, PACKAGING AND PACKING

C. E. WARING, Davison Chemical Company
H. M. WALRATH, Preservation, Packaging and Packing, QM F&CI

CONTAINER TESTING

F. D. LONG, Container Corporation of America
C. F. FULLER, Container Testing Division, QM F&CI

Introduction

During World War II there was set up in the Quartermaster Corps a Subsistence Research and Development Laboratory for the purpose of improving military rations with the end in view of having the American Armed Forces the best fed military establishment in the world.

After the War it became apparent that the strong and forceful liaison which had been built up between the Subsistence Research and Development Laboratory and the food and container industries generally should be kept alive so that in peacetime industry would be able to contribute to the research and development program of the Armed Forces.

It was with this thought in mind that a group of farseeing industrialists sponsored the formation of the Associates of the QM Food and Container Institute for the Armed Forces, which had become the successor of the Subsistence Research and Development Laboratory.

A dedication dinner was held in Washington, D. C., in November 1947 and at that time the Associates instituted a program of public service in behalf of national defense.

The central purpose of this program was (1) to review the work which had been done during the war in defining and attacking the technical problems encountered by the Armed Forces in adapting foods and containers to the varied conditions of military feeding operations, and (2) in the light of past experience and current needs to see where the Associates might be of assistance. There was a need, for example, to develop rations to meet specific situations, such as that of survival after land or sea disasters, for which the requirements were not fully known. A continuing need was to bring the full resources of the industries into play in improving all rations.

The program began with the establishment of close working relationships with the QM Food and Container Institute for the Armed Forces, the center of the Armed Forces research and development activities on foods and the packaging and packing of these and related items.

The Associates, representing food and container manufacturers from coast to coast and private and public research laboratories from all sections of the United States, were able to bring to this partnership a wide variety of technical and scientific talent, research and development facilities far greater than could be provided by the Department of Defense, and a reservoir of industrial experience and knowledge applicable to the Armed Forces' need for foods and containers suited to the rigors of military operations in extremes of climate and terrain.

The Nucleus of Research and Development Work—The Quartermaster Food and Container Institute for the Armed Forces

The QM Food and Container Institute for the Armed Forces is a section of the Research and Development Branch, Military Planning Division of the Office of The Quartermaster General, in Washington, D. C. The Institute has the primary responsibility for conducting the necessary research and development required to keep all Armed Forces' rations abreast of advances in the science and technology of foods and containers, abreast also of the changing requirements of military operations.

Results of this work are finally reflected in specifications, and hence the Institute is an important point of contact between the food and container industries of the nation and those responsible for defining the food and container needs of the Armed Forces; namely, the Institute. The program of this research and development agency of the Armed Forces embraces the design of new rations or ration components, the improvement of existing rations or their components and the design or improvement of containers to protect military supplies under various conditions of handling and storage.

Feeding the Armed Forces satisfactorily on packaged rations entails (1) designing foods and containers that will meet the exacting conditions of military use and (2) assuring that the items as designed can be produced by industry in huge quantities with minimum changes in processing equipment.

In fulfilling its function the Institute

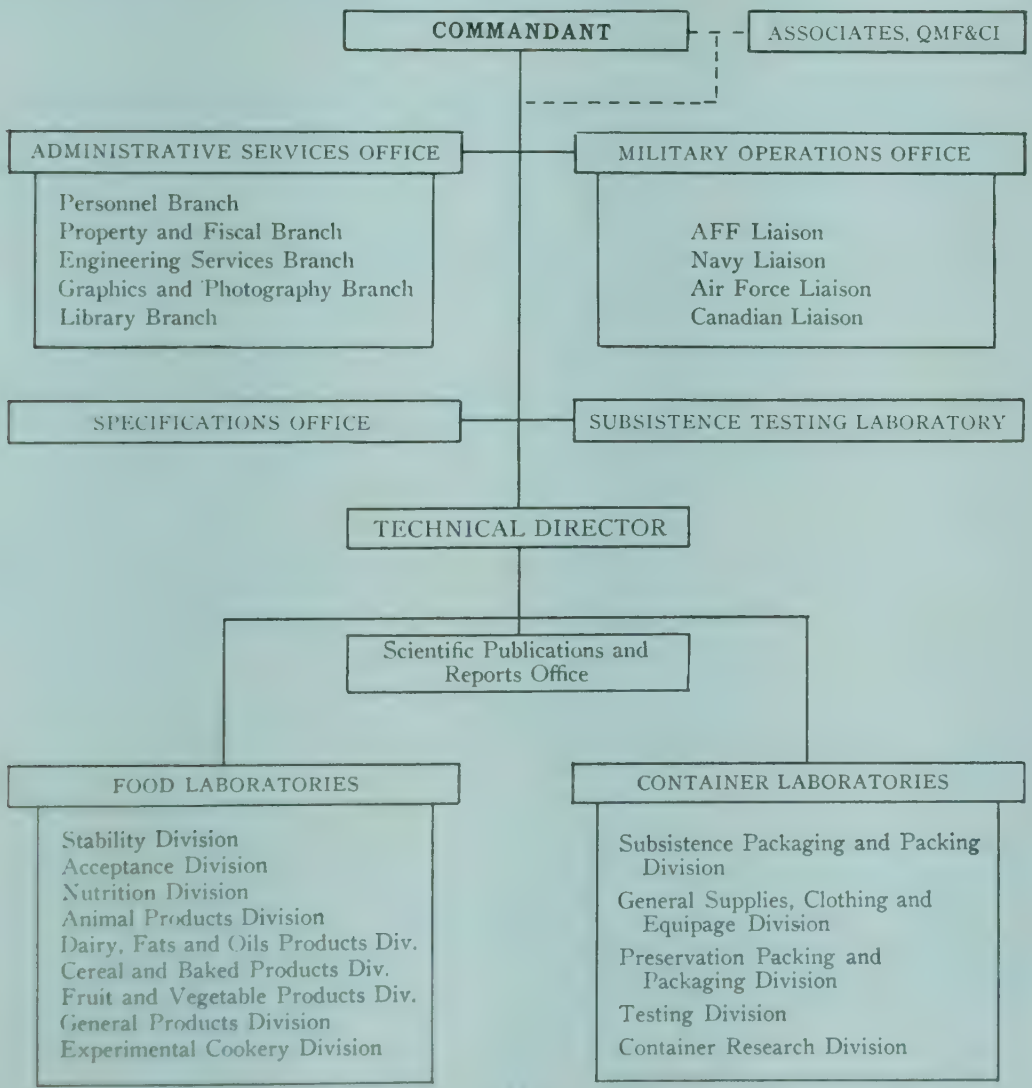
1) *ascertains* from the using agencies what qualities in foods or their containers are required by the Armed Forces for the most effective feeding of men in large groups, in small groups, or individually with due regard for conditions encountered in the various latitudes and terrains where they may be called upon to operate,
2) *projects* these requirements into a program of research and development which will yield end-items that are fully adequate in palatability, stability and ease of use in the field to meet modern military conditions where speed and flexibility of movement are of prime concern,
3) *develops* food items that are adjusted to the taste and food habits of Americans of military age and at the same time are adequate in nutrients to meet the needs of our fighting forces,
4) *develops* or guides the development of containers that will protect military subsistence and other supplies against the rough handling and sundry types of storage imposed by military necessity,
5) *performs* such basic research on the foods and containers used

by the Armed Forces as will assure technically adequate answers as opposed to expedient or tentative answers to problems of safekeeping that arise in the supply lines,

6) *surveys* the technical information being developed by industry and institutional scientists and technologists and wherever possible applies the findings to the foods and containers required by the Armed Forces,

7) *provides* the technical requirements on which specifications for foods and containers for Armed Forces' use are based.

The Institute which has the central responsibility for all food and container research and development performed for the Armed Forces is administered by the Commandant with the aid of (1) military experts, well acquainted with the food and container problems encountered in actual military feeding operations, and (2) civilian specialists, trained in the sciences and technologies relating to foods and the packaging and packing of military subsistence and other items. The general outline of the organization may be seen in the following chart:



Function of the Associates, Food and Container Institute, Inc.

To understand the function of the Associates it is necessary to know something of the background of its founding. In rapid summary the Associates was founded

1) to perpetuate the excellent cooperation existing between the Subsistence Research and Development Laboratory (predecessor organization to the QM Food and Container Institute for the Armed Forces) and industrial and institutional agencies concerned with subsistence problems,
2) to prevent the recurrence of food losses, such as those reported after World War II, by a closer liaison between those who make and those who use the foods and containers supplied the Armed Forces,
3) to expand the research and development resources of the Armed Forces,
4) to correlate, through specifications, desired military characteristics in food and container items with processing and other production potentials.

In the fulfillment of these original purposes the Associates have convened in conferences with the staff of the QM Food and Container Institute for the Armed Forces, have reviewed food and container problems confronting the Armed Forces, have aided in stating them in concise, readily understandable form, and have established task groups under a general Activities Committee, to participate in their solution. As a collateral activity the Associates have reviewed the military specifications pertaining to foods and containers and have helped to establish sound, practicable specifications that meet military requirements without placing impossible demands on the highly complex techniques and equipment of the food and container industries.

The contributions of the Associates to the specifications program of the Armed Forces is so important a phase of their work that the following letter and memorandum, which review the recent progress of specifications work, are highly pertinent at this point.

MUNITIONS BOARD
WASHINGTON 25, D. C.

11 Apr. 1950

MEMORANDUM FOR THE ASSISTANT SECRETARY OF THE ARMY
SUBJECT: Subsistence Specifications

1. It is with pleasure that I note that in the field of military subsistence, all departmental and service specifications have been converted into Federal or Military specifications.

2. The Quartermaster Corps, and particularly the Quartermaster Food and Container Institute for the Armed Forces, are to be commended for the planning and execution of the comprehensive program which has resulted in optimum specification coverage in this important field.

3. The magnitude of the task of maintaining these specifications current and of reviewing the older Federal specifications to assure inclusion of military requirements, as outlined in the January 1950 report of the Quartermaster Food and Container Institute, is appreciated. However, I feel that this undertaking, too, will be most creditably accomplished.

HUBERT E. HOWARD, Chairman.

DEPARTMENT OF THE ARMY

OFFICE OF THE ASSISTANT SECRETARY

WASHINGTON, D. C.

18 April 1950

MEMORANDUM THRU: The Assistant Chief of Staff, G-4
FOR: The Quartermaster General

SUBJECT: Subsistence Specifications

1. I am pleased to note the attached memorandum from the Chairman of the Munitions Board commending the progress of the Quartermaster Corps in converting service specifications covering subsistence into Federal or Military Specifications.

2. Please convey my appreciation, together with that of Mr. Howard, to those members of the Quartermaster Corps whose efforts have contributed to the success of this undertaking.

ARCHIBALD S. ALEXANDER
The Assistant Secretary of the Army

Subject: Subsistence Specifications

G-4 19954 1st Ind

Assistant Chief of Staff, G-4, Department of the Army, Washington 25, D. C.,
21 April 1950

To: The Quartermaster General

I am pleased indeed to transmit herewith the appreciation of The Assistant Secretary of the Army and of the Chairman of the Munitions Board for your accomplishment of optimum specification coverage in the field of military subsistence.

The record of the Quartermaster Corps in raising to a higher order tentative specifications for all its commodities is one of the best of all technical services.

T. B. LARKIN
Lieutenant General, GSC
Assistant Chief of Staff, G-4

QMGRS 400.1141 2nd Ind.

Dept. of the Army, OQMG, Washington 25, D. C., 23 May 1950

TO: Commandant, Quartermaster Food & Container Institute for the Armed Forces, 1819 W. Pershing Road, Chicago 9, Ill.

1. It is a distinct pleasure to transmit the preceding correspondence indicating that The Department of the Army and Munitions Board are appreciative of a difficult job well done. I realize that a tremendous effort still must be expended in changing to Military Form those specifications which have been administratively converted, as well as including in most of the active Federal specifications the latest technological advances.

2. Please convey to your entire specification staff my own appreciation of their commendable accomplishment. The return of this file is desired.

H. FELDMAN
Major General, USA
The Quartermaster General

In the natural process of growth and development the original objectives of the Associates have become more sharply defined. As they now stand the objectives are:

1) To indicate, on the basis of industrial experience, the types of problems that require attention and the areas of investigation that need to be expanded,
2) To cooperate with the Food and Container Institute in applying research results to ration development problems,
3) To speed the application of research and development findings to end products needed by the Armed Forces to assure the best attainable foods and containers for our forces at home and overseas,
4) To provide a strong liaison between the Armed Forces and industry in order that the volume production of rations, their components, and the containers that carry them is not impeded through ineffective or inapplicable specifications or through misunderstandings of the technical requirements involved in their production,
5) To facilitate the mobilization of food and container technologists and to assure the utilization of their talents in the most effective manner possible during periods of emergency,
6) To prevent costly duplication of research and development effort through the coordination of information on food and container projects being undertaken by industrial and institutional agencies over the nation or within the research and development program of the Armed Forces,

7) To conduct or encourage programs of study covering food and container problems that arise in connection with feeding military forces at home and overseas in various extremes of climate and operational environments,

8) To distribute information on food and container problems, specifically on problems of processing, handling and storage, that stand in the way of better rations for our fighting forces.

Present Status

It would not be overstating the case to say that the Associates, partly by original intent but chiefly as a result of their efforts to make a practical contribution, have pioneered new territory in government-industry relationships. One characteristic of this pioneer enterprise has been to ascertain at first hand the attributes which rations for the Armed Forces must have. Perhaps no other organization, founded to supplement a private or a public enterprise, is organized to provide aid and counsel as the Associates have provided it; namely, from the level of where the problems originate on up to the level where the proposed solutions can be tested in production. As Clarence Francis, Chairman of the Board, General Foods, acutely remarked at the second annual meeting of the Associates, Dayton, Ohio: "In my opinion, this is one of the finest demonstrations of cooperation between business and government that I have ever witnessed. It is the democratic way."

Equally important is the support given the Associates by the highest echelons of the military establishment. Thus Major General Herman Feldman, The Quartermaster General, in a letter to Dr. Berton S. Clark writes: "I consider the Associates one of the strongest industry organizations for the furtherance of research and development needs that the Quartermaster Corps has at its disposal. Many of the accomplishments of the Food and Container Institute for the Armed Forces during the past two years may be directly traced to the Associates."

It is evident that armed with the support of the industries, of research institutions in the universities and elsewhere, of military leaders, there is nothing to prevent the Associates making a contribution to our national defense that will stand as a model for all time. The basis of that contribution will be the faithful fulfillment of each of our present objectives. The accomplishments of the Associates to date warrant confidence in the success of our future efforts to make our Armed Forces "the best fed fighting forces in the world."

Luncheon Speeches and Business Meeting

Tuesday, April 25, 1950

CLARK

Will the meeting please come to order?

First, I would like to thank Capt. Cunningham, the Public Information Officer of Fort Knox, for his excellent cooperation with Major Dobson and Col. Isker in planning the program which will take place tomorrow at the Post and with assisting us in our public relations program with the press, radio and television media today.

Another matter—and one that is a cause for regret for all of us—can best be handled by reading this letter:

DEWEY AND ALMY CHEMICAL COMPANY
Cambridge, Mass.

Bradley Dewey, President — March 29, 1950

Dr. Berton S. Clark
President
Associates Food and Container Institute
1849 West Pershing
Chicago, Illinois

Dear Clark:

I am sorry that a vitally necessary business trip to Europe keeps me away from the meeting, but you may be sure that I am with you in spirit and will try to put in enough penance time on my return to make up for my absence.

I hope that the meeting will highlight that while research on foods, packaging, clothing, and a host of other problems of World War II showed that it could aid the care of the soldier, the civilian, and the problems of logistics in a war a thousand times more complicated than anything known in the past, it had no time to more than point the way. If another war comes, the problems will be even more complicated. Emergency rations for civilian population and protection against many types of new hazards will complicate problems of supply, transportation, and storage.

Against this background, we must remember that because of the present-day absence of competition coupled with the drive of restless sales managers, salesmen, advertising men, and all that goes to pep up the civilian developments of our economy, military research must be helped, stimulated, encouraged, and backed every day of the week if it is to be kept from drifting into mediocrity and passive acceptance of the philosophy of "manana."

Our Research Associates are dedicated to see to it that we help in every way possible the staffing and the performance of the laboratory at Chicago and the problems allocated to it by the armed services. The needs of the future must be anticipated now and solutions reached if we are to properly fulfill our functions.

Kindest personal regards,

Sincerely yours,
(s) Bradley Dewey

BD:JC

We are all well acquainted with the first speaker this afternoon—Deputy The Quartermaster General and Chief of the Military Planning Division, Major General W. H. Middleswart!

Observations on Research and Development as it Pertains to Preparedness Planning

MIDDLESWART

Dr. Clark, Fellow Soldiers, Sailors, Airmen, and Guests:

I had some prepared remarks which I had intended to make but since I had only one copy, which I gave to a reporter, I will now have to talk "off the cuff."

I want to speak briefly about the reorganization of the Department of Defense which has particular significance to us. You will recall that ten years ago Germany conquered Poland in six weeks. Why? Superior weapons!

The lessons learned then and later brought into being an organization known as the Research and Development Board. The National Defense Organization is spending about five hundred million dollars a year for research and the Research and Development Board plays an important part in these expenditures. It was originally organized under Dr. Vannevar Bush, later was directed by Dr. Compton, and is now under Mr. Webster. It has set up technical objectives outlining fields in which research is to be done. The Board is manned principally by civilians on a consultant basis who serve on various segments or panels of the Board. If any of you gentlemen are on any of these panels, I would suggest that you take your work very seriously. These are the men who "call the shots" in so far as research and development activities are concerned.

Research and development can effect remarkable savings of time, labor and money. Let me cite one quick example. Yesterday I had the pleasure of going across the river to Jeffersonville where we have a large Supply Depot. I was stationed there 29 years ago and was very much surprised at the change which had taken place. We have a substantial research activity there on mechanical items. Among the items of interest I saw was a vehicle being developed to provide for inspection of complete cases of food by x-ray. This is to be used, generally, for surveillance inspection at depots and will, if successful, prevent the long and tedious business of having to open cases to examine the contents. I would like to mention that Colonel Glenn, Chief of the Inspection Service in New York, who is present, was in Jeffersonville yesterday, following up on the development relative to this vehicle. Let me take this opportunity to present him to you. Colonel Glenn!

I think you are going to enjoy your visit to Fort Knox. You will see, though rapidly, other results of research and development. You will see, for example, various kinds of tanks in operation, and a battalion in attack. We are also going to see the Patton Museum, a monument to the memory of this great soldier. I remember so well the aggressive type of soldier he was, and it is only fitting that a museum should be established in his honor. There, too, you will see research and development—in retrospect. No field, perhaps, changes so rapidly as the weapons field.

Speaking for my own Branch, the Quartermaster Corps, and particularly the Industrial Mobilization Planning Office let me highlight briefly our own program. We are going to survey about 10,000 plants in our preparedness program. In the food and container industries we are working in five different fields: First, combat rations, second, dehydrated items, third, boneless beef, fourth, items requiring special packaging, and fifth, machine tools for special packaging and similar operations. This is the extent of the Industrial Mobilization Planning program at present.

The basic problem of food is not only availability, but also the apportionment of food between the civilian population and the military services. The food industry is called a "reserved" industry—in other words it has been decided that there will be no conversion of food processing plants into other types of plants, which practice may be widespread in other industries. That is because of the essentiality of food-stuffs to the people and to the military service.

A further organization with preparedness functions I would like to mention is the National Security Resources Board. This is considered so important that Mr. W. Stuart Symington has been transferred from his position as Secretary of the Air Force to head up this Board. This organization, among other things, is the peacetime War Production Board counterpart. You may be trying to recall just what this Board is for, what it is supposed to do. Let me give a part of the answer by describing its bearing on the Quartermaster Corps.

Since the war the Quartermaster Corps has been studying what would happen in the event of disaster—what psychological problems, what morale problems, and what other problems would arise. These problems have been turned over to the National Security Resources Board who have studied them, analyzed them into their components, and farmed them out as projects to other organizations. They are also concerned with rations in time of war, and allocations between the civilian population and military services. In brief, they are searching for answers—the basic purpose of all research and development.

Since the beginning of the history of our country, men have been willing to fight but not many people realize that it is in the time of peace that we must get prepared. Not many men are willing to give of their time, nor have the financial resources to do the work you are doing. To this group, there is no accolade I can pay you which is too high. I thank God that we have people in this country who are willing to do this work for patriotic reasons, pure and simple. Your role in preparedness in the research and development phases of foods and containers for Armed Forces use is a vital one!

CLARK

Thank you very much, General Middleswart!

We all remember the Associates' notable Second Annual Meeting held last year under the sponsorship of the Navy at Norfolk, Virginia! We all remember the warm welcome extended to the Associates by Admiral Foster, Chief of the Bureau of Supplies and Accounts of the U. S. Navy. Today we have with us the Deputy Chief of that Bureau, Rear Admiral George W. Bauernschmidt. Admiral Bauernschmidt!

BAUERNSCHMIDT

I am happy to be here today to show the Navy's enthusiastic support of the program of the Associates, Food and Container Institute. At any time and under any conditions the Navy's interest in this group would be great, but today it is particularly great. If or when, World War III comes, it will have two characteristics. One—it will come suddenly, we will not have the two or three years' of preparation that preceded World Wars I and II. And, secondly, it will be a war of scarcity and not a war of plenty, as were World Wars I and II. We cannot afford in the next war to waste our national resources.

The Associates are in a sense stock piling for us today two things—brains and materials. The man in uniform during war will accept anything when he understands that it is required. He will eat anything even to the two handfuls of parched grain which the soldiers in Caesar's time lived on. He will eat anything he may have to, but his morale will suffer badly if he doesn't receive those things to which he is accustomed when he knows they are to be had. The things to which he is accustomed depend on his national habits. I had several hundred Japanese prisoners working for me on Guam. After some thought had been given to the matter, they were given a ration largely made up of canned vegetables and beef stew. After some weeks they came to me and said they wanted different rations. After questioning them, we learned they wanted rice—they wanted their "bellies" full. They were accustomed to eating rice and were not accustomed to eating our rations. As a matter of fact, it was a substantial savings for Uncle Sam, because they

could then be fed for about fifteen cents a day as compared to fifty cents a day.

I wonder how many realize the contrast that exists between the group of scientists and developmental research workers in this organization and any similar group of men assembled in Russia today. You are working voluntarily; you are enjoying your work; you are doing it for the sheer love of it. You do not have behind you a Commissar with a gun, figuratively or real, saying "THINK." The way in which you are operating is the American way, and it is a way of which we can all be proud.

In summing up my thoughts with regard to this program, I can say that I have been impressed, greatly impressed!

CLARK

Thank you very much, Admiral Bauernschmidt!

No military program would ever be complete without a representative of the Department of the Air Force. So, it gives me great pleasure to introduce Colonel George H. Dietz, Chief of the Services Division.

COL. DIETZ

Feeding problems which presently confront the Air Force cover three major areas. These three areas govern the feeding of our ground troops, in-flight feeding, and pre- and post-flight feeding involved when personnel are on extended or regular missions. The areas are not entirely new to the Air Force but modern concepts of airlift have a direct bearing on the type of feeding that we must utilize in the future.

Added to these areas are the nutritional problems which confront the Air Force on the whole and those shared in common with similar facilities of the Army and Navy. Within the Air Force, there is an additional consideration of reducing the human recovery time between long flights to a minimum. This goal can only be successfully attained if accurate data are available upon which to evaluate results correctly.

In general, the same food nutrients essential for personnel on any type of duty are essential for flight crews. There are certain factors which affect the mental and physical state of the human being. They are primary to our problems when evaluating the nutritional welfare of flight personnel. There is, for example, a definite toll of nervous and physical energy which is cumulative after a period of several hours. Noise, vibration, motion and lack of stability, not always noticed by veteran flyers, all play a part. Decreased atmospheric pressure results in a slowing down of the digestive processes and increases the volume of intestinal gases. Vitamin C may be depleted by repeated exposure to high altitude flying. Limited experimental data indicate that other

operational stresses result in conditions which can be at least partially off-set by the proper dietary management and control.

In the process of providing the air crewman with the most appetizing, acceptable, nutritive food possible, it is essential to synthesize all correlated problems. We must have balanced items of food, acceptable under the conditions for which they are intended. To provide food not acceptable to the consumer is a waste of time, effort and money. Storage stability, operational suitability, nutritional adequacy, appetite idiosyncrasies, weight limitations, space limitations, packaging applicability and physiological factors must all be considered before a meal or a ration is provided.

While, for the most part, pre- and post-flight feeding are accomplished within the regular ground feeding facilities, there are certain variables which have to be known and provided for in order to maintain the required nutritional level.

I mentioned previously that the Air Force has three definite areas to consider in the feeding of its troops; namely, ground personnel, personnel operating on long range bomber missions, long range high altitude fighter aircraft missions and personnel moved by the Military Air Transport Service. Our biggest problem concerns the feeding of personnel during extended flights.

During World War II, this problem was acute. Various means were used in attempts to resolve it with but varying degrees of success. Swifter fighter and reconnaisance airplanes and larger bombers, carriers and cargo air-craft with increased range and consequent longer hours of sustained flight are continually adding new elements and demands to the problem. Further research is required into the types of suitable food, the ground preparation of food to be served in the air, and the type of equipment required aloft for serving food at acceptable temperatures and in palatable form.

Present Air Force activities range from the Tropics to polar regions. The entire gamut of climatic conditions and temperatures of our sphere is encountered, including the rarefied atmosphere of heights heretofore never reached. The effect of these conditions on food and the problem of sustaining personnel engaged in such flights offer a field for experiment and development barely touched by scientific research.

As you probably know, two institutions are presently active researching our problems; the Aero Medical Laboratory at Wright-Patterson Air Force Base, Dayton, Ohio, and the Armed Forces Food and Container Institute, Chicago, Illinois. I believe that substantial progress has been made in this field of research. Each type of meal designed

thus far is subject, of course, to change as a result of controlled field tests.

The complexity of flight feeding in the Air Force may further be noted by its natural division into six types of requirements, each with its own pecularities. Delineation of these requirements, together with the present solution offered, are summarized as follows.

Pilots of fighter and long range reconnaisance aircraft require a light lunch that can be eaten readily without leaving the controls or removing the mask or gloves. The use of a palatable snack rich in carbohydrates for a quick "lift" has resulted in recommendation for test of two cardboard packages with contents readily accessible, one containing several types of specially prepared chocolates, the other fruit-filled crackers. The problem of consuming liquids which are vitally necessary to the operators of aircraft is still unsolved. Thermos jugs and bottles are available for hot or cold beverages. The shape of these bottles and the methods by which the liquids can be consumed resolve themselves into further problems. It is possible that the liquids may be consumed through a tube which is attached to the thermos or an insulated container fastened to the body of the pilot or the airplane. This project is in the experimental stage, but we hope to have the answer soon.

For the long range bomber crews, we have developed a processed meal known as the Food Packet, Individual, Combat, In-Flight 2, which has been procured after considerable research. Presently it is used as the operational and training flight meal, available for pilots and crews of strategic bomber aircraft such as the B-29. This meal is entirely canned. It consists of four six-ounce cans containing a variety of canned fruits, crackers, cookies, candy, cooked meat items, and an accessory packet of soluble beverages, powdered milk, condiments, gum and plastic spoon. The meat items consist of seven types which are packed so as to allow changes in menus. We believe that the number of meat items must be increased to at least twenty-five types in order to provide for individual acceptability of food. Certain equipment to accompany this meal has been developed. This consists of an electrically heated oven for warming the meat component and a hot cup, also electrically heated, for preparing coffee or tea.

Long range bomber and hospital evacuation airplanes have been authorized for limited testing purposes on pre-cooked frozen meals of the Maxson type, used on transoceanic flights by several commercial airlines. This type of meal consists of selected menus commonly served in civilian eating establishments, pre-cooked and frozen in individual trays for delivery to the aircraft. They are stowed aboard, under refrigeration, and at the proper time are heated for serving in a specially designed electrically controlled oven. The advantages of this type meal

are obvious. The disadvantages are the special equipment required, the continuous low refrigeration storage, and the limited number of companies that can process the items.

The pre-cooked frozen meals are served to a limited degree to passengers and crews on certain Military Air Transport Service aircraft. In general, the box lunch consisting of sandwiches, fruit, cake or cookies, hot soup or coffee, comprises the flight meal for this activity. Some of the newer military aircraft for passenger service are equipped with built-in galleys similar to those found on commercial passenger aircraft. They have been designed to accommodate electrically heated ovens, and in the galley it is possible to prepare sandwiches, salads and cold snacks with hot soups and beverages.

Air rescue operations present the problems of feeding pilots and crews on searching missions plus the need for a ration that can be dropped to sustain survivors of a crash until rescue can be effected. The IF-2, already described, partially satisfies the first requirement yet it becomes monotonous by continued use. Sandwiches, soups and hot beverages may be used to give variation, or precooked meals may be served from food warmers if the type of aircraft in use permits these luxuries.

When survivors of an aircraft accident find themselves alive, but in desolate environment, the thought of food to sustain them until assistance arrives is of paramount concern. The search to find a type food that would serve best in this type of predicament has finally resolved itself into a quest for a ration of high carbohydrate content that is not thirst provoking. Two types of compressed food bars have been researched, one for arctic use and another for temperate and tropic areas. Procurement is being made of each of these items for large scale field testing and use although considerable research is still necessary on an all-purpose survival ration for the tropic and arctic regions for both Air Force and Ground Force use.

Thus, within the Air Force, the fascinating job of ministering to a most important human need of the airman goes on. Too often taken for granted, the unglamourous task of feeding personnel has at last been properly recognized as a career. Food Service in the Air Force has indeed become of age. It is able to stand upon its own legs even if at present those legs are somewhat wobbly. We are on our way. Further education and experience in this field will bring us to our goals.

CLARK

Thank you, Colonel Dietz!

The following two reports will summarize for you the activities of the Associates during the year and the status of our fiscal affairs.

Annual Report of the President
Associates, Food and Container Institute, Inc.

BERTON S. CLARK, President

(April 25, 1950)

During the year 1949-50 we have made great progress in our program of assistance to the Armed Forces on technical problems in the procurement of foods and containers.

Undoubtedly the most important phase of the work was the direct assistance rendered to the Quartermaster Food and Container Institute by the Activities Committee. Under the guidance of Dr. W. R. Johnston, Vice President, the Committee has established an effective structure for studying a wide variety of problems. The details of the program and a visual presentation of the accomplishments will be the main events of the Third Annual Meeting. Surely the Associates can be proud of the work of the Activities Committee.

COOPERATION WITH QUARTERMASTER ASSOCIATION

During the year relations between the Associates and the Quartermaster Association have been clarified and a program for coordination of the activities of the two organizations has been approved by The Quartermaster General.

As reported at the 1949 Annual Meeting The Quartermaster General requested clarification and definition of the objectives of the Associates and the Quartermaster Association, and indicated the need for a plan to coordinate the activities of these two groups. A meeting of the officers of the Associates and the Quartermaster Association was held in New York on June 14, 1949. At this meeting the officers of the Quartermaster Association suggested that the Associates amalgamate with the Association.

The proposal for amalgamation was considered and rejected by the Board of Directors of the Associates on August 2, 1949. A committee representing the Associates then met with The Quartermaster General and the Chief of the Research and Development Branch, OQMG, to explain in detail the work of the Associates, particularly the functions of the Activities Committee.

The policy thinking was clarified at this Washington meeting. Later the same day a short meeting was held with the President and Executive Secretary of the Quartermaster Association. On January 13, 1950 these two gentlemen met with the Executive Committee of the Associates at the Institute for final consideraion of procedures to comply with the policy requirements of The Quartermaster General's office.

The several meetings served to establish a constructive basis of cooperation and led to a plan for a Liaison Committee which was presented to The Quartermaster General as follows:

1819 West Pershing Road · Chicago 9, Illinois Lafayette 5500, Ext. 4262
Associates FOOD and CONTAINER INSTITUTE

January 26, 1950

Major General Herman Feldman
The Quartermaster General
Second and T Streets, S. W.
Washington 25, D. C.

Dear General Feldman:

On January 13, officers of the Quartermaster Association, Mr. Roy A. Cheney, President, and Col. Walter A. Pashley, Secretary, met with the Executive Committee of the Associates, Food and Container Institute, at the Institute in Chicago, for mutual consideration of a plan which might be adopted to meet your thoughts on coordinating the activities of these two groups.

There was complete agreement that the objectives of the two groups were not in conflict and that both groups perform valuable, constructive, and much needed services. To define these objectives and also to supplement and strengthen the services of both groups, it was decided that an appropriate liaison committee should be established. Two major responsibilities would be assigned to this committee, as follows:

1. To reduce to writing the objectives of the two groups in a paper suitable for publication, and to disseminate these objectives to industry generally for the purpose of clarifying the work of both the Quartermaster Association and the Associates, Food and Container Institute.
2. To serve as a clearing agency for two-way flow of results obtained on projects of mutual interest.

There was a strong feeling that this committee would be most effective if the Chief of the Military Planning Division of the Quartermaster Corps could serve as Chairman.

The executive officers were instructed by the joint group to present this plan to you and proceed with the details of forming a liaison committee if this procedure meets with your approval.

FKG

Respectfully submitted

Berton S. Clark, President
Associates, Food and Container Institute

Roy A. Cheney, President
The Quartermaster Association

General Feldman's approval of the plan is indicated in the following communication.

DEPARTMENT OF THE ARMY
OFFICE OF THE QUARTERMASTER GENERAL
WASHINGTON 25, D. C.

IN REPLY REFER TO
QMGQC 080
(QM Assn.)

9 February 1950

Dr. Berton S. Clark, President
Associates, Food and Container Institute
1849 West Pershing Road
Chicago 9, Illinois

Dear Dr. Clark:

The agreement to establish a Liaison Committee to bring together the Associates, Food and Container Institute, and the Quartermaster Association appears to be a most logical step. General Middleswart will be glad to serve as Chairman of the Liaison Committee.

I am sure that the efforts of the Liaison Committee will result in an even closer association between the two groups.

I have advised Mr. Cheney, in a separate communication, of my concurrence in the proposed plan.

Sincerely yours,
H. FELDMAN
Major General, USA
The Quartermaster General

In accordance with the plan, the President and the Vice President in Charge of the Activities Committee were designated by the Executive Committee to serve as members of the Liaison Committee. The first meeting will be held at the Brown Hotel in Louisville, Kentucky on April 26, under the Chairmanship of General Middleswart. It is hoped that an informal report on this meeting can be presented to the Associates before we leave.

Thus, under the capable guidance of The Quartermaster General, a plan has been devised which will emphasize and strengthen the activities of both organizations.

MEMBERSHIP

There are now 200 *Industrial* and 169 *Institutional* members as compared with 218 *Industrial* and 110 *Institutional* members, one year ago. Pending clarification of relations with the Quartermaster Association, only moderate efforts have been made to obtain new members.

Maintenance of our membership at its present high level is accordingly an excellent measure of the loyalty of the members and of their interest in the work of the Associates.

An aggressive campaign should now be undertaken to acquaint non-members of the food and container industry with our operations and secure their cooperation through active membership in the Associates.

FINANCES

The Treasurer's Report shows that a sound financial position has been maintained. It is anticipated, however, that a greater proportion of the income will have to be used in the future to support the expanding work of the Activities Committee.

WORK OF THE COMMITTEES

Executive Committee

The Executive Committee has the immediate responsibility for initiating policy and guiding the day-to-day operations of the organization. The Committee's actions are, of course, subject to the approval of the Board of Directors. In all instances where new policies or programs are involved, the decisions of the Executive Committee are referred to the Board of Directors for a vote by mail.

Three full day meetings of the Committee and two meetings with the Board of Directors have been held during the year at the Quartermaster Food and Container Institute. The members have attended these meetings faithfully and have worked diligently to implement the activities of the Associates in support of the research and development program of the Institute.

Activities Committee

The outstanding work of the Activities Committee under the fine leadership of Dr. W. R. Johnston, Vice President, merits the highest possible commendation.

In keeping with the importance of this work, a very large proportion of the Annual Meeting time will be devoted to the Activities Committee's report. Free discussion of the report is solicited and the members are urged to suggest ways and means of broadening and improving our service to the Armed Forces.

Annual Meeting and Program Committee

This meeting at Louisville and Fort Knox is the culmination of the year-long efforts of the Annual Meeting and Program Committee to arrange a meeting under favorable conditions where leaders of industry

and officers of the Armed Forces can discuss mutual problems related to the welfare of the country.

In behalf of the Committee, I wish to thank the Army, through Major General Livesay, for inviting the Associates to hold their meeting at Louisville and Fort Knox. I am sure that all of us appreciate the opportunity to become better informed about Army activities.

By-Laws Committee

Dr. Fred Blanck, Chairman, and the other members of the By-laws Committee have spent considerable time in examining the framework of the laws that govern the activities of the Associates. In the interest of improved operating efficiency of the organization they have suggested a number of important changes in the By-laws. I think that these changes are desirable and should be accepted.

Nominating Committee

Mr. H. S. Mitchell, Chairman, and the other members of the Nominating Committee have attempted to select nominees in such a manner as to assure equitable representation on the Board of Directors and yet be consistent with the interests of the Institute in the current problems of the Armed Services.

PUBLICATIONS

The booklet "Food and Container Problems of the Armed Forces" was published by the Associates and distributed to the membership in May. A revision, including additional problems, was mailed to members in August. A third issue, presenting an up-to-date list of the problems which face the Armed Forces, and so outlining the work for the Activities Committee of the Associates in 1950-51, will be distributed at the Louisville meeting.

Copies of the May and August 1949 issues of the "Activities Report of the Quartermaster Food and Container Institute" were distributed to the Associates. The publication was suspended, however, after the August 1949 issue due to a shortage of Institute funds. The Associates have now agreed to underwrite the first issue of a re-activated Institute "Activities Report."

The proceedings of the "Yeast in Feeding Symposium" are now in press. This symposium, held in Milwaukee on November 8, 9, 10, 1949, was sponsored by the Quartermaster Food and Container Institute, the Brewers Yeast Council, the Yeast Industry, and the Associates. Over two hundred people, including a large number of Associates, attended and heard 27 technical papers. Most of the cost of publication is being paid by contributions from the industry.

The *Proceedings* of the last annual meeting (1949) also appeared during the year.

PUBLIC RELATIONS

During the last two years, our public relations program has been developed to a high degree of efficiency. Active counsel and assistance from Carl Byoir and Associates has been an important factor in these programs. News of the Norfolk Meeting was published in hundreds of daily and weekly papers from the *Christian Science Monitor* to the *San Francisco Chronicle*. Wide publicity was also obtained in the trade magazines. All publicity releases have been censored by the appropriate authorities. The Byoir services have been ably supplemented by the public relations work of the Secretary's Office and the Institute itself. Through these combined efforts the patriotic work of our Associates has been carried to the public not only by the press but also over radio and television and from the speaker's platform.

ACKNOWLEDGMENT

The program of the Louisville and Fort Knox Meeting contains an impressive list of leaders of the food and container industries and of the Armed Forces who are giving their time, energy, and good will to the unique and patriotic service embodied in the purpose of the Associates. They are fulfilling the foresighted concept of service of those inspired men who pioneered the founding of the Associates. It has been an honor and a pleasure to have had the privilege of serving with them.

Annual Report of Treasurer

As of 30 April 1950

Presented by
MR. J. R. T. BISHOP, V. P.
International Minerals and Chemical Corporation

The report consists of the following attachments:

1. Statement of Financial Condition.
2. Financial Report.
3. Schedule of Expenses.
4. Proposed Budget for Fiscal Year 1951.

ASSOCIATES, FOOD AND CONTAINER INSTITUTE, INC.

Statement of Financial Condition
As of 30 April for each of the years 1948, 1949, 1950

	As at 30 April 1948	As at 30 April 1949	As at 30 April 1950
Assets			
Cash, First National Bank, Chicago	$13,319.53	$ 7,240.61	$16,541.78
Office Cash Fund			49.84
U. S. Govt. Securities at Market Value plus Accrued Interest		15,375.69	15,373.40
Equipment, less 10% reserve for depreciation			484.44
Total Assets	$13,319.53	$22,616.30	$32,449.46
Liabilities, Reserves and Members' Equity			
Accrued Taxes and Salaries Payable	$ 35.26	$ 321.89	$ 57.42
Reserve for Dinner Fund Expense	309.13	360.00	
Deposits, 1950 Meeting, less expense paid			823.72
Membership Dues Paid in Advance	2,100.00	2,000.00	100.00
Unearned Dues, May and June for each respective year	2,383.33	3,333.33	3,283.33
Deposits on Yeast Publication, less Expenses Paid			1,373.98
Reserve Funds Set-Aside—From years ended:			
4-30-48/49	3,575.00	8,575.00	8,575.00
4-30-50			4,925.00
Excess of Available Earned Dues Over Expenses—From years ended:			
4-30-48	4,916.81	4,916.81	4,916.81
4-30-49		3,109.27	3,109.27
4-30-50			5,284.93
Total Members' Equity	8,491.81	16,601.08	26,811.01
Total Liabilities, Reserves and Members' Equity	$13,319.53	$22,616.30	$32,449.46

ASSOCIATES, FOOD AND CONTAINER INSTITUTE, INC.

*Financial Report for Twelve Months ended 30 April 1950**

Including Comparison with years ended 30 April 1948 and 1949

	12 months ended 30 April 1948	12 months ended 30 April 1949	12 months ended 30 April 1950
Membership Dues Earned:			
From prior fiscal years; two months ended 30 June, for each respective year	$	$ 2,383.33	$ 3,333.33
From current fiscal year; ten months ended 30 April for each respective year	11,916.67	16,666.67	16,416.67
Total Membership Dues Earned	$11,916.67	$19,050.00	$19,750.00
Deduct: $25.00 per member per year set aside to accumulate reserve funds of $100.00 per remaining member (in accordance with resolution of Board of Directors)	3,575.00	5,000.00	4,925.00
Remainder of dues available for current expenses	8,341.67	14,050.00	14,825.00
Expenses as shown by attached schedule	3,424.86	10,982.25	9,825.28
Excess of earned dues, less set-asides, over expenses	4,916.81	3,067.75	4,999.72
Add:: Interest accrued on investments		41.52	285.21
Total of excess of available dues and interest over expenses	$ 4,916.81	$ 3,109.27	$ 5,284.93

*According to the By-laws, the fiscal year ends 30 June. In accordance with written instructions of the Treasurer, this report has been prepared on the basis of twelve months periods ending 30 April, with adjustments between fiscal years and allowance for dues not earned (pro-rata) for May and June 1950.

ASSOCIATES, FOOD AND CONTAINER INSTITUTE, INC.

Schedule of Expenses

	12 months ended 30 April 1948	12 months ended 30 April 1949	12 months ended 30 April 1950
Organization Expense	$ 1,234.01	$ 1,081.14	$
Conference and Travel Expense	498.31	992.19	902.93
Lecture Expense	107.25		
Publication Expense, Gross	1,181.67	4,809.44	2,864.63
Less: Contributions Received	700.00	3,113.80	808.50
Net Publication Expense	$ 481.67	$ 1,695.64	$ 2,056.13
General Expenses			
Services	$ 205.00	$ 4,336.53	$ 5,722.90
Stationery and Printing	579.60	1,447.44	204.20
Postage	259.03	628.26	289.58
Telephone and Telegraph	44.97	71.63	149.85
Sundry Expenses	15.02	112.95	384.92
Total — General Expense	$ 1,103.62	$ 6,596.81	$ 6,751.45
Contributions (Yeast Symposium)		616.47	
Loss on Meeting			107.38
Activities Committee Expense			7.39
Total Expenses	$ 3,424.86	$10,982.25	$ 9,825.28

ASSOCIATES, FOOD AND CONTAINER INSTITUTE, INC.

Proposed Budget for Twelve Months ending 30 April 1951

Funds Available		
Excess of Available Earned Dues Over Expenses and Set-asides of Reserve Funds:		
From 12 months ended:		
30 April 1948	$4,916.81	
30 April 1949	3,109.27	
30 April 1950	5,284.93	
Total Available Funds from three years ending 30 April 1950		$13,311.01
Estimated Dues Income for 12 months ending 30 April 1951		20,000.00
Total Funds Available for 12 months ending 30 April 1951		$33,311.01
Proposed Set-aside of Reserve Funds, and Proposed Expenditures for 12 months ending 30 April 1951		
Set-aside of $25.00 per member, two hundred members		5,000.00
Proposed Expenditures		
Salaries and Travel	8,000.00	
General Expense[1]	3,680.00	
Publication Expense in excess of reimbursements therefor[2]	4,800.00	
Expected excess of expense over income from Annual Meeting, April 1950	600.00	
Activities Committee	1,000.00	
Contingencies	1,920.00	
Total Proposed Expenditures		20,000.00
Unexpended income estimated to be available at end of 12 months ending 30 April 1951 after set-aside of reserve funds and proposed expenditure		8,311.01
Total Available Funds		$33,311.01

[1] Office expense, stationery, postage, taxes, 'phone, etc.
[2] Printing.

Report of Activities Committee

CLARK

This session of the Third Annual Meeting will now come to order. Your presence here is evidence of strong support of the activities of the Associates and a great encouragement to the people who are giving time and energy to the development of the program that has been evolved over the years. I am sure they will appreciate the large attendance here today.

You will all remember that the first meeting of the Associates was held in Chicago about three years ago when an Interim Committee under the leadership of Mr. Harry Williams was set up. I would like to say that the energy, spirit and tireless leadership, as well as his faith in the purpose of the group has never diminished since the day he took over the leadership. He is here at considerable personal sacrifice due to the fact that his own company is opening its new research laboratory today. He has been so enthusiastic and so strongly behind this program that he came to these meetings to lend his further good will. I think that is a wonderful record!

The first year of the Associates was spent largely in building upon the solid foundation that was established at the Dayton meeting. A great deal of thought was given not only to the foundation and establishment of the program but to methods of procedure. During the second year of our history, under the leadership of Mr. Tom Rector, who was Chairman of the first Activities Committee, the Activities program was organized and the various sub-committees were brought together. The problems of the Armed Forces with respect to food and containers were stated and published in a pamphlet which has been revised several times and a real program of research and development with the Armed Forces was started.

You all know, I presume, that we have been saddened by the news that Mr. Rector died suddenly of a heart attack about three weeks ago. At this time I would like to call on Mr. Williams to present a memorial to Mr. Rector. Mr. Williams, please!

WILLIAMS

Ladies and Gentlemen! In tribute to Tom Rector the Board of Directors recommended this resolution to the membership at our meeting last night.

THOMAS M. RECTOR

February 26, 1894 . . . March 31, 1950

The untimely death of Thomas M. Rector creates a loss that will be felt by the Associates, Food and Container Institute, as an organization, and by each of its members individually. His industry, his leadership, his devotion to principle and cause, and his warm and friendly counsel, were assets that will not soon be replaced. His unselfish and untiring effort in behalf of the program of the Associates, and his cooperation with the Armed Forces to strengthen the national defense will stand as a monument to his patriotism and idealism.

For these reasons, and out of their deep sense of personal loss, the members of the Associates, Food and Container Institute, hereby pay public tribute to Thomas M. Rector, and extend to his family and his colleagues their expression of sincere condolence.

CLARK

Let us all stand for one minute in memory of Tom Rector!

CLARK

At the last annual meeting in Norfolk, Virginia, it was announced that Mr. Rector would serve on the Research and Development Board for Food as Chairman of the Committee. At that time, I think perhaps both he and the people in the General Foods Corporation felt that he was overtaxing his strength and that he should not attempt to carry on as Chairman of the important Activities Committee of the Associates. Dr. Johnston, Director of Research of Standard Brands, was thereupon elected Vice President in charge of the Activities Committee of the Associates. He has done an outstanding job during this past year. We couldn't have had a better man for that job. He has spent a lot of time and made many trips to Chicago, both in connection with the Committee work and the work of the Executive Committee as a Director. His Committee has arranged a program to which this session of the meeting will be devoted; namely, a report by subcommittees, of the work of the Activities Committee. Dr. Johnston!

General Review of the Year's Work

JOHNSTON

I believe that it is clear to everyone who has a program before him that the Activities Committee of the Associates is really an organization composed of seven working committees, each charged with responsi-

bility in a separate field, corresponding to the organization of the Quartermaster Food and Container Institute for the Armed Forces. I can say without exaggeration that each group involved in the work of the Activities Committee has done a fine job—especially when it is realized that each Committee is composed of busy men with many other responsibilities. Cooperation between the Institute and the Associates is excellent. I am sure that I speak for our entire organization when I say that we have been given the feeling that we are virtually a part of the Institute. I think the credit for this fine cooperative atmosphere justly should be given to Col. J. S. Kujawski and Mr. George Gelman, Commandant and Technical Director, respectively.

It is with profound regret and with a feeling of great personal loss that I refer to the absence of Tom Rector. As you know, he was largely responsible for the formation of the Activities Committee and I wish so much that he could be present to see what we have tried to do.

The specific objectives of this work for the past year have been the isolation and solution of those urgent problems faced by the Institute (see Appendix for recapitulation of problem statements) which seemed amenable to solution in a short time through concerted effort. How successful we have been will appear from the various reports which follow. You will note from the Committee reports that there have been at least five different approaches toward the solution of the problems which we chose to tackle.

First, the development and testing of methods. This covers the study of physical and chemical and analytical procedures for testing food and container materials. Second, the development of open formulas as exemplified by the work of the Fruit and Vegetable Products Committee. By open formulas, I mean those which can be presented to industry for bidding without disclosure of industrial secrets of any type. Third, the standardization of industry practices. This is an important feature in the Animal Products study. For example, in the 4-Way Boneless Beef Program and in the estimation of the vacuum in canned meats — both approaches aim at standardization. Fourth, surveys of present industry products and practices. A survey of available canned meat products is an example of activity in this field. Fifth, the discussion and evaluation of the problems of the Armed Forces. This is a very important phase of our work. All concerned with research activities know that a basic feature of successful research is the presentation of the problem in such a fashion as to be certain that the objective is clearly evident and precisely stated.

Now, I should like to discuss briefly the question of the apparent incompatability of open specifications and private industry "know-how."

We are all well aware of the basic truth that technical progress depends upon competition and the competitive edge often depends upon private "know-how." How then can we write specifications which will permit the Armed Forces to procure the most wholesome and nutritious food at sensible cost in such a fashion that the Armed Forces know what they are getting? This has not seemed to be a serious problem in regard to machinery, instruments, or munitions, since objective performance tests and other revealing measurements are commonplace in those areas of procurement.

But foods are such complex mixtures that reliance must be placed upon flavor acceptability and other subjective performance tests. Measurements of the type needed for specifications have been widely used. The nature of this problem, I believe, points up the unique value of the Associates to the Armed Forces. As you know, the Associates is composed largely of technical men drawn from the research and manufacturing departments of industry. If performance tests and other critical measurements of food quality can ever be developed, it is this group of men who can do it, and it may be fair to state that scarcely any other group of individuals can do the job.

The report of the General Products Committee on soluble coffee will do much both to clarify the point and to illustrate progress in a difficult field. On behalf of the whole Activities Committee, I should like to express our pleasure and gratitude for the opportunity to present our findings and plans to the group assembled here. Representing, as you do, all the branches of the Armed Forces and the food and container industries, many of you have had intimate first-hand experience with the problems of the Quartermaster Food and Container Institute for the Armed Forces, upon which our work has been centered. I hope you will be as candid and as searching as possible in your criticisms so that we may be kept "on the beam."

Coming back to the organization of the Activities Committee, you will note that for each sub-committee the head of the appropriate product branch served as the Institute Coordinator in carrying forward the work. We shall hear from these gentlemen in the course of the program, especially during the round table discussions scheduled for this afternoon.

Col. Kujawski and Mr. Gelman have served as Institute Coordinators for my portion of the Committee's work. It now provides me real pleasure to call on Mr. Gelman, Technical Director of the Institute, for a few words of comment on the Institute's view of the potentialities inherent in the Activities Committee of the Associates. Mr. Gelman!

GELMAN

Mr. Chairman, members of the Associates, and friends! In the remarks of the succeeding speakers who will address you this morning, I believe that the developments and contributions of the Activities Committee will impress you as much as it has our own staff who have been virtually amazed at how much has been possible through the intense cooperation and effort of Dr. Johnston and his group. I believe that even if there had not been a single solid contribution made to the solution of our research and development problems, the mere fact that the food and container industries have worked so closely with the QM F&CI in advising and counselling us as to how to shape our program—the mere fact that you folks know that that counsel and advice has been available and that our program has been reviewed and planned for the most effective usefulness—I think that in itself has been a very helpful thing not only to your own peace of mind but to those of us in the laboratory who feel very keenly the tremendous responsibility to ensure that we are in as effective a state of preparedness as it is possible for us to be.

Several years ago, Maj. Gen. McAuliffe, who at that time had just been appointed head of the Research and Development Group of General Staff, was asked to address the Chicago Section of the American Chemical Society. He made quite a point of the fact that at that time, and I think this is more true now than it was then, that it wasn't enough to write letters to industry or write articles or give talks once in a while. We must bring industry into the back room so they can really work with the Army, Navy or Air Force, as the case may be. I suppose a rose by any other name still holds. This isn't exactly the "back room" of the Institute but for the purpose of Gen. McAuliffe's remarks, I believe that the reports which follow will take you folks into the back room.

A lawschool professor once told his class: You are bound to win your case if you have the facts pounded home to the jury and if you have the law pounded home to the judge—but if you have neither the facts nor the law behind you—pound the table!

I don't think these gentlemen are going to be pounding the table this morning and I am sure you will be judge and jury of that! Thank you!

JOHNSTON

Thank you, Mr. Gelman! We will proceed to see what we can do without pounding the table. Dr. Gross of John Morrell and Company will start off with his report on Animal Products. Dr. Gross!

GROSS

Members of the Associates and Guests!

The objectives of the Activities Committee are well known to you. As applied to the Animal Products Section, they were: first, to get together the best talent available in the form of task groups to attack specific problems; and second, to provide advice on Food and Container Institute problems on the operating level.

In order to accomplish these objectives, several preliminary meetings were held to become acquainted with the details of the problems at the operating level. An advisory group consisting of Mr. Victor Conquest of Armour and Company, Dr. Roy C. Newton of Swift and Company, and Mr. Harry J. Williams of Wilson & Co., Inc., met to form the policy, to select the specific problems, and to plan a course of action. The decision was to attempt to lay a firm foundation for Industry-Institute cooperation and to limit the specific objectives to projects of importance, but, at the same time, to projects which would show results in a short period. The basic effort has been to establish the pattern of cooperation and coordination so that in future years the work could be expanded with the assurance that the foundation was firm and lasting. A detailed report will be made later on the specific projects and the results achieved. At this point, I would like to dwell for a moment on the abstract achievements which appear to me to have even greater significance. Through the sound counsel and guidance of the Advisory Group, it has been possible to secure the complete cooperation of all industry personnel approached. This same spirit has existed in the Food and Container Institute. Therefore, I feel there exists in industry a sincere desire to cooperate fully and unselfishly with the Institute toward the goal of helping to solve the problems facing them. Heretofore, the barrier, if any existed, has been the lack of a channel through which such cooperative effort could be effectively directed. The Associates provide such a channel and in addition stimulate and vitalize the effort. The Activities Committee is the tool that implements the action on an operating level.

During the coming year, the work of the Animal Products Section will be expanded, and I hope that at least one long-term project of fundamental and basic importance can be started. In research work, the so-called "bread and butter" problems must receive attention, but there is also urgent need for applied research and technological development. The extreme importance of the basic research approach must never be overlooked. Unfortunately, in many fields affecting the work of the Animal Products Division, the fundamental and basic principles are unknown. An analysis of the problems indicates the need for such information to ensure a final satisfactory solution. It is for this reason

that it is hoped that work on at least one such problem can be started next year.

To return to the report on projects. We are indebted to and deeply grateful for the assistance of the National Meat Canners Association and the American Meat Institute for their part in securing materials and data on an industry-wide basis. On all the projects, the work was done on an Industry-Institute cooperative basis rather than being done by one or more members of industry working singly or together on a problem independent of the Institute. At this time, I would like to acknowledge the work of Mr. B. W. Gardner and his associates both on the projects and preparation of the data for this report.

The first project was concerned with the level of vacuum in canned meats. This is a problem of great importance. It is desirable that specifications be written to assure the Armed Forces of a sound product under all conditions of use, and to eliminate points of controversy between manufacturers and representatives of the Armed Forces who are procuring and inspecting. A request to supply information about vacuum in their products was made to all vendors who receive "Invitations for

TABLE 1

VACUUM IN CANNED MEAT PRODUCTS

Commodity	Inches of Vacuum In Finished Product		
	Small size	Medium size	Large size
Roast Beef		8	10
Tamales		9	9
Beef and Gravy		8-17	
Beef Stew		7-15	
Chili with Beans		8-10	
Chili		7-8	8
Corned Beef Hash		8-10	10
Frankfurters or Wieners		5-10	
Hamburgers		10-17	
Meat and Spaghetti		9-12	
Luncheon Meat		7-13	
Chopped Ham			10
Pork Sausage Meat		14	
Pork Sausage Links		14	
Pork and Bar-B-Q		10	
Lamb Stew		12-15	
Veal Stew		12	
Meat Chop Suey		11	
Liver Pate	10		

Bids" to manufacture canned meats for the Armed Forces. Thirteen responded with the necessary information. *Table 1* shows the vacuum level in the various commercial products. The small size cans are in the range of 4 to 6 ozs.; the medium, up to 4-lbs.; and the large, 4 to 7-lbs. You will notice that in no case is there less than an average of 7 inches of vacuum shown. The Armed Forces felt that these figures would assure them of a sound can under almost all conditions of use, whether in the mountains, in an airplane, or in the humid jungle. These vacuum figures will be reflected in the next revision of the Armed Forces' specifications. If you do not agree with these figures, you should contact the Activities Committee and present your idea of what they should be, so that the specifications will reflect a realistic fact.

Other information obtained was to note a trend in method of securing the vacuum in canned meat products. Prior to World War II, a majority of packers used thermal means only for obtaining vacuum. Of the 13 companies reporting, 3 obtained vacuum by mechanical means only, 5 by thermal means only, and 5 by thermal and mechanical means. This is of significance to the Armed Forces because it will enable them to purchase more products manufactured by the cold pack method. This method of putting raw meat in the can seals in the meat juices and gives the product a better flavor. Projects such as a cold pack Beef and Vegetables with Gravy can now be reconsidered.

The next project relates to the second problem in the 1949 edition of *Food and Container Problems of the Armed Forces.* This problem concerns getting new and improved canned meat items for the Armed Forces' use. The first step here was to ascertain the exact status of canned meat products used by the Armed Forces and those which are manufactured for commercial use. To do this, a survey was made. Two hundred and ten companies who received "Invitation for Bids" were contacted and requested to supply samples. Twenty-one of them responded. That is not quite so great a discrepancy as is indicated because a number of the companies included in the 210 are now no longer manufacturing canned meats and some are out of business. These 21 companies really represent quite a large percentage of the industry. The size of this response necessitated determining the validity of the results obtained from this survey. To do this, three points were checked.

First, the Institute made a study of some of the chain stores supplying canned meats to the middle income group in the Chicago area. It was found that there were 63 manufacturers supplying 50 different items for consumer selection. The 50 items which these 63 manufacturers were supplying corresponds favorably in number to the 50 items from 21 manufacturers participating in the Associates' survey. However, 11 items were not found in the Associates' survey but had

been given consideration by the Armed Forces in their work on canned meats, although no product examination had been made in the Institute study.

The *second* point that was checked to determine the validity of the survey was that of making a comparison of the results with that obtained in 1946 by one of the nation's leading commercial survey organizations. *Figure 1* shows you briefly the results of the Associates' survey. The

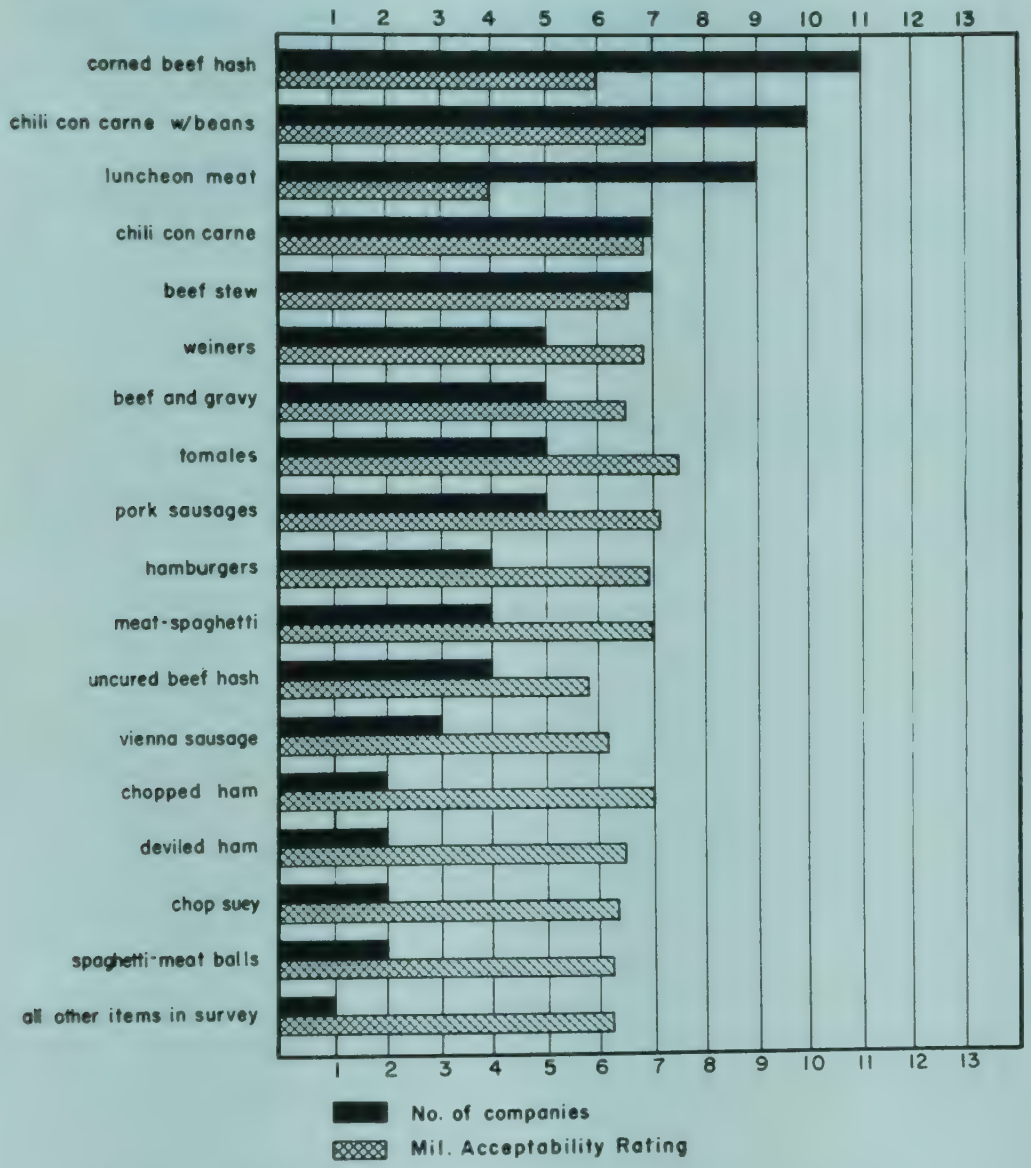


FIG. 1. Number of companies submitting products and military acceptability ratings.

commercial survey made in 1946 indicated approximately the same relative degree of commercial acceptance that is shown by the number of manufacturers producing any one product. The black line shows how

many of the 21 manufacturers participating produce any one given product. It is safe to assume that the number of manufacturers producing an item is indicative of the popularity of that item on the commercial market. Since the Associates' survey covered a large part of the nation, these figures should be fairly representative.

The *third* point which was checked to determine the validity of the survey was comparison of the results with 1949 production in establishments operating under the regulations of the Meat Inspection Division, Bureau of Animal Industry, United States Department of Agriculture. Luncheon Meat, Corned Beef Hash and Chili Con Carne were produced in the largest quantities in 1949. The survey indicated the same. Vienna Sausage was produced in large quantities in 1949; the response on the survey was not indicative of this. It was found that Tamales were about in the middle position as far as 1949 production was concerned. The same was found in our survey. Time does not permit discussing this point further. These figures will be available at the round table conference this afternoon.

Let us now turn to a consideration of these results from the standpoint of military acceptability, which is illustrated by the cross-check lines. In many instances these lines do not correlate with commercial acceptability. This lack of correlation can be accounted for to a certain extent by the fact that Armed Forces personnel have used certain items to the point where monotony has decreased their acceptability. Of lesser importance, but affecting their acceptability, is the fact that large-scale preparation does not permit the same degree of improvement that can be expected in home kitchen preparation. An example of both of these points is Luncheon Meat, which was produced in tremendous quantities, thereby lessening its acceptability. On the other hand, Tamales have been given a fairly high military acceptability rating, probably because they have been used to a very limited extent. Those items which do not reach 5 on this chart can be considered to have low acceptability value for the use of the Armed Forces.

There is another point of value which was obtained from this survey. *Figure 2* shows a comparison between the results obtained in the Associates' survey and those items used by the Armed Forces. Of the fifty items found, 34 were found to be adaptable to military use. During World War II and the postwar period, the Armed Forces have prepared specifications and tried 58 different items. Of these, 45 were found to have satisfactory military acceptability. Since time does not permit individual comparison of items by name or groupings, such as is shown in *Food and Container Problems of the Armed Forces* (see Appendix), I will simply state that the items used by the Armed Forces and those

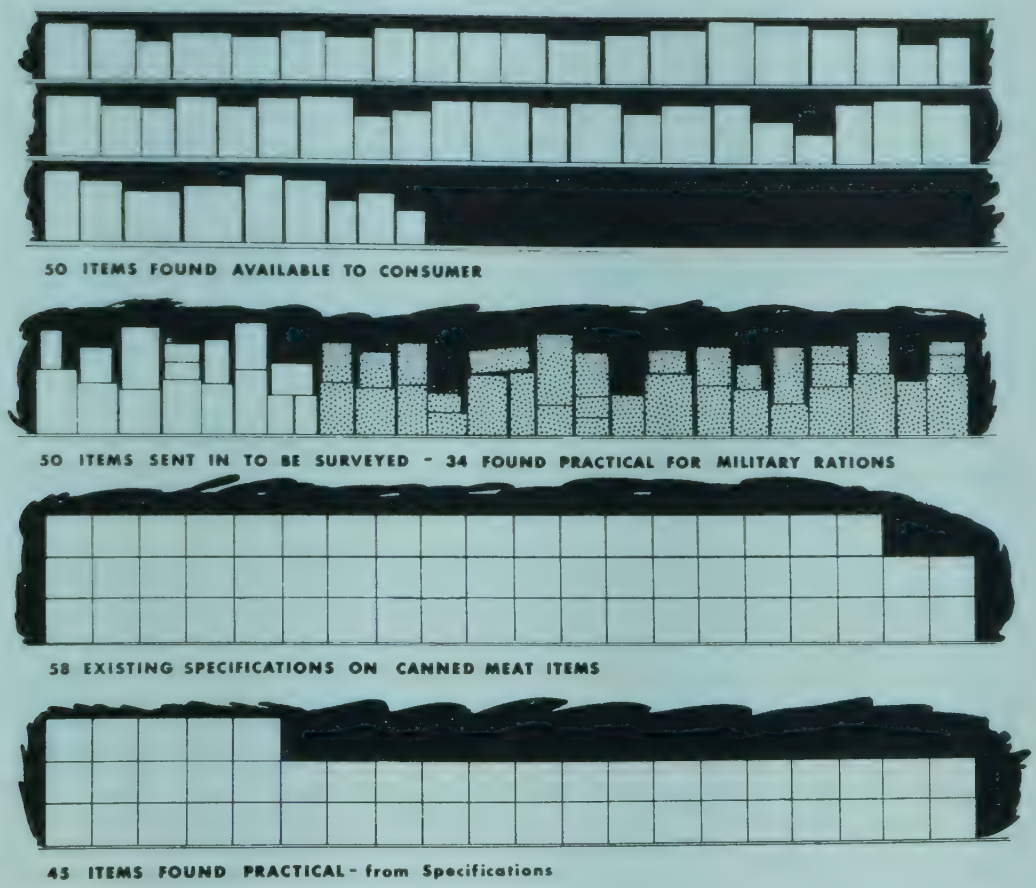


FIG. 2. Commercial canned food survey. (Availability of items.)

items manufactured commercially are nearly identical in characteristics. Therefore, a mere comparison of numbers is valid. A summarization of the figures shows that the Armed Forces are exploiting manufacturing resources to the fullest extent in supplying a variety of canned meats. This then leaves us but one road to travel toward getting new or improved canned meats for Armed Forces use—that of new ideas or new products.

Since the war, the Armed Forces have considered 10 new ideas presented by industry. The Associates survey produced one new idea. It is hoped that by our continuing work on this problem, the Armed Forces will have something that will "pay off." Perhaps I should explain what I mean by "pay off."

In every war canned meats have been subject to waste on account of lack of acceptability. World War II was no exception in this regard. Records of our activity in attempting to remedy this situation show that the cost of time and material for the past year amounted to $3,300.00. It seems to me that this is a small investment to make for a

potential "pay off" of millions of dollars. For example, in 1943 co-operative efforts of the Armed Forces and Industry produced an improved Beef and Gravy and Pork and Gravy. It was not only more acceptable but was produced at less cost. This difference in cost saved the government 6½ million dollars during the war. On a peacetime basis it saved the government 300 thousand dollars for one fiscal year. These figures are also potential "pay offs." Investment of another 3 thousand dollars to get more ideas like the one obtained this year is certainly a good investment, if they "pay off" as Beef and Gravy and Pork and Gravy have.

The next project dealt with "Fabricated Frozen Beef." The 1949 edition of the problems booklet set forth the points that were to be overcome in order to make frozen boneless beef satisfactory for Armed Forces use. The Institute with the cooperation of industry carried on an extensive program which solved this problem. The result was a 4-way product instead of a 3-way product. The old 3-way boneless beef product consisted of roasting and frying meat, 40 per cent; braising and stewing meat, 30 per cent; and ground beef, 30 per cent. The new product consists of roasts or steaks for dry heat cooking, 30 per cent; roasts or steaks for moist heat cooking, 20 per cent; diced meat for braising or stewing, 12 per cent; ground meat, 38 per cent. You will recall that your problems booklet stated that braising and stewing meat contains excessive fat and waste. To eliminate this difficulty the meat was diced into pieces weighing up to 10 ounces each, resulting, of course, in modification of manufacturing procedures.

In *Figure 3* the box of meat on the left is the braising and stewing meat from the old product while the box of meat on the right consists of the diced meat for braising and stewing. I believe it can be readily seen that this method eliminates the difficulty and effects a worthwhile improvement. The Activities Committee contributed to this program in various ways.

A Task Group was formed, originally headed by Mr. Gislason of Swift & Company, and later by Mr. Pollock of the National Livestock and Meat Board. This group offered counsel on this problem and arranged a meeting with the Armed Forces representatives and those members of the meat boning industry who were interested in manufacturing frozen boneless beef. This meeting was held on 14 April, 1950. About fifty people were present from industry. It is felt that the Associates were able to contribute to a further understanding on the part of industry as to what the Armed Forces want, and to aid industry in the manufacture of Armed Forces food items. As a result of the Institute's activities, and with our assistance, this problem will be

FIG. 3. Boneless Beef (open cartons).

eliminated from the 1950 edition of *Food and Container Problems of the Armed Forces.*

We need the help of manufacturers in submitting to the Institute new products and ideas. If you have some item that hasn't "panned out" commercially or which you do not wish to exploit, you might try sending it to the Institute or to the Activities Committee for an examination of its military characteristics. Remember, commercial acceptance and success do not necessarily correlate with military acceptability. The converse also holds true. We would like to discuss such items with you at the round table conference this afternoon. We would also be pleased to receive your comments and suggestions regarding the work done and future plans.

This concludes the formal report, except that at this time, I would like to introduce Mr. Gardner of the Animal Products Division of the Quartermaster Food and Container Institute, who has been largely responsible for the work and the report on this subject. I would also like to express appreciation to Mr. Hambling for the splendid visual aid work. As has been said before, Colonel Kujawski, from the very beginning of the Activities Committee, has realized the potential value of the work and has gone the limit in extending cooperation and

expediting arrangements. To him and to his staff should go a large share of the credit for any accomplishments that may be accredited to our group.

It has been a real pleasure and a privilege to be associated with this work during its initial phases.

JOHNSTON

Thank you, Dr. Gross, for a fine report! I should like to announce that although Dr. Gross will be unable to continue as Chairman of the Animal Products Sub-committee, we have been able to obtain the services of Dr. William Shannon, General Product Controller of Oscar Mayer and Company, who will carry on next year. Dr. Gross has kindly consented to maintain the coordination aspects of the work and will serve on Dr. Shannon's Committee. We can look forward to continued progress in the coming year.

I should like to emphasize also that the meeting this morning is so crowded that we cannot allow time for discussion. As Dr. Gross has pointed out there will be opportunities for detailed discussion at this afternoon's round table session.

Now, going on with our report, I would like to call on Dr. Peters of The Quaker Oats Company, who will give the report on *Cereal and Baked Products.* Dr. Peters!

Report of the Subcommittee on Cereal and Baked Products

PETERS

Mr. President, Chairman, ladies and gentlemen and guests! In the problems booklet will be found about 15 separate projects under the Cereal and Baked Products Section (see Appendix for complete list). Some are well on the way to solution but need an added touch here and there; a few others have still a long way to go. This report deals with three types of problems but somewhere in the broad work of the Institute, each Associate will find at least one project which will tie in with his own business. His cooperation with the Institute on this cannot be other than mutually beneficial.

Problem 1. Everyone is familiar with the individual packages of breakfast cereals such as wheat, rice, or corn flakes which contain 1 ounce of dry product. These are consumed by civilians with perhaps one or two teaspoonfuls of sugar and three or four ounces of fluid milk. The palatability of these is high but the task of getting such a ration overseas and particularly to mobile units, is obviously tremendous. To lessen the task, the first step was to use dry milk rather than liquid, but the cereal is so bulky it requires a weight of package material greater than the weight of the cereal itself in order to transport it safety. Someone suggested compressing the product, and this was an advance but

was not entirely satisfactory. Finally, it was decided to mix the cereal with milk solids and sugar in the same relative proportions as they are normally consumed and to compress the mixture into a 2-ounce bar. This proved to be a happy solution! The dry weight of an ounce of cereal plus a teaspoonful of sugar and sufficient dry milk to go with the cereal is 1.5588 ounces so the compressed cereal bars weighing 2 ounces actually furnished 28.3 per cent more food than the standard cereal serving.

Tables 2 and 3 are comparisons of ordinary cereal servings with compressed premixed cereal bars. The conservation of shipping space,

TABLE 2

THE SPACE SAVING ADVANTAGES OF COMPRESSED READY-TO-EAT CEREAL

COMPRESSED READY-TO-EAT CEREAL (with milk and sugar added)		NON-COMPRESSED READY-TO-EAT CEREAL (plus milk and sugar in equivalent quantities)	
Ingredients:		Ingredients:	
Cereal	234 ozs.	Cereal, 234-1 oz. boxes	234 ozs.
Milk	80 ozs.	Milk, one 5 lb. can	80 ozs.
Sugar	51 ozs.	Sugar	51 ozs.
Shortening	37 ozs.	Shortening	none
Salt	2 ozs.	Salt	none
202-2 oz. bars	404 ozs.	Total	365 ozs.

always a critical factor in time of war, and the decrease in packaging requirements, a boon to hard-pressed wartime industry, are readily apparent.

Table 4 tells the rest of the story. One million servings (1,000,000 oz.) of cereal weigh 62,500 pounds, as shown, but packaged for shipment, they have a gross weight of over 167,000 pounds. About 21,000 pounds of dry milk and 13,500 pounds of sugar would be added to this cereal in the field. This total of 97,000 pounds of food product with a shipping weight of almost 211,000 pounds occupies a space of 18,290 cu. ft. Now, compare this with the weight and volume of 1 million 2-ounce compressed bars. Remember that in these bars we have 28.3 per cent more actual food than we had before, but the gross shipping weight is only a little more than 149,000 pounds and bulk is 3,188 cu. ft. Therefore, there is a net saving of 29.4 per cent in shipping weight and a space saving of 82.6 per cent.

TABLE 3

PACKAGING SAVINGS
COMPRESSED VS. NON-COMPRESSED CEREAL

Cereal, ready-to-eat
300 packages 1 oz. ea.
Weight:
Gross 50.29 lbs.
Net 18.75 lbs.
Cubic ft. packed 5.12
Cubic in. per oz. packed 29.51

Sugar, granulated
6 bags 10 lbs. each
Weight:
Gross 61.4 lbs.
Net 60 lbs.
Cubic ft. packed 1.5
Cubic in. per oz. packed 2.7

Non-fat milk solids or dry whole milk
6 cans 5 lbs. each
Weight:
Gross 41.3 lbs.
Net 30. lbs.
Cubic ft. packed 1.24
Cubic in. per oz. packed 4.47

Cereal, ready-to-eat, Premixed, compressed W/milk and sugar added
320 bars 2 oz. each
Weight:
Gross 47.69 lbs.
Net 40 lbs.
Cubic ft. packed 1.02
Cubic in. per oz. packed 2.75

TABLE 4

COMPARISON OF PHYSICAL PROPERTIES OF READY-TO-EAT CEREALS

Compressed Bar (2 oz.) vs. Cereal (1 oz.) Plus Milk and Sugar

	Compressed Premix	Cereal	Milk	Sugar	Total	Per cent Saving
Total servings	1,000,000	1,000,000	1,000,000	1,000,000	...	...
Net wt., lbs.	125,000	62,500	21,410	13,516	97,426	—22
Gross wt., lbs.	149,031	167,623	29,489	13,832	210,944	29.4
Vol., cu. ft.	3,188	17,067	885	338	18,290	82.6
Paper used, lbs.	18,028	90,497	4,282	253	95,032	81.0
Cu. in./oz. packed	2.75	29.51	4.47	2.7		

The proportions of cereal, milk and sugar given above are the same as in the premixed cereal. One serving of cereal, milk and sugar = 1.5588 oz. One serving compressed bar gives 28.3% more food than furnished by the cereal, milk and sugar.

The problem today is to obtain products in addition to wheat, corn, and rice flakes. New taste combinations, new textures are desired for the sake of variety. Any ready-to-eat cereal is a candidate for this ration if it has good shelf life and if it is physically suited for incorporation into this type of product.

Since there is no procurement program for this ration today, a manufacturer cannot afford to set up full-scale equipment to make special types of cereals for this ration, but experimental quantities of new cereals are frequently produced and, if these are made available to the Institute, this particular problem can be kept up to date. Several have been submitted during the year; more are desired. Submission involves disclosure of no trade secrets or technical "know-how."

Problem 2. There are many cake mixes on the market. Some are complete and require only the addition of water to make the batter; some require milk and others demand both milk and eggs. The Institute is interested in complete mixes and, for obvious reasons, requires products with a long shelf life. The goal is stability at 100° F. for 6 months.

There are many things that can go wrong with a cake mix during storage. It may lose its leavening and fail to rise; its original flavor may disappear; its texture may deteriorate, or it may be either gummy or excessively tender. Many reasons for such failures can be given, but no one knows all the answers. Two apparently identical mixes may exhibit wide differences in keeping quality. Shortening, cocoa, flour, moisture, all influence the shelf life of a mix, but what specifiications to set up for these ingredients is a serious problem and, even worse, how can a mix be tested ahead of time and be accurately judged to have a satisfactory shelf life. After the product is 10,000 miles away from the factory and has been in storage 6 months—this is no time to discover it is substandard.

The Associates have attacked this problem on two fronts. First, samples of complete mixes have been given the Institute and are now under observation. Second, technical data from manufacturers' laboratories have been submitted. Let us review what has been found out about a few of these products and their military characteristics.

Table 5 tabulates moisture and free fatty acid values on a number of commercial mixes before and after storage in a hot room for 45 days.

The first 3 samples are from the same original lot of material and the second group of 3 appears to be from another batch. The first sample was protected from moisture absorption, probably by special packaging. Its FFA content probably remained constant; the 0.3 per cent decrease could be accounted for by experimental error. There is no doubt but that the moisture content of Sample 2 went up and its free fatty acid

TABLE 5

FFA AND MOISTURE CONTENT OF CAKE MIXES BEFORE AND AFTER 45 DAYS STORAGE IN HOT ROOM

Mfr.	ORIGINAL PERCENTAGE		END OF 45 DAYS PERCENTAGE	
	Moisture	FFA	Moisture	FFA
A	3.5	2.0	3.7	1.7
A	3.5	2.0	7.3	9.5
A	3.5	2.0	3.5	1.9
A	3.8	1.1	3.8	1.0
A	6.3	1.1	7.1	2.5
A	8.1	1.1	9.7	3.3
A	2.9	0.85	3.0	0.86
A	7.2	1.0	6.9	1.80
B	7.8	1.4	7.9	3.2
B	3.6	1.5	3.4	2.0
B	3.4	1.3	3.4	1.4
B	6.3	1.4	7.8	2.6
C	9.0	0.73	9.8	3.4
C	5.4	0.62	4.7	0.44
C	5.4	0.62	6.2	0.83
C	8.2	4.7	10.0	6.5
D	5.0	0.57	4.5	0.45
D	5.0	0.57	6.0	0.59
E	4.7	0.53	6.4	1.7

NOTE: Underlining denotes unsatisfactory performance.

almost quintupled. One might be inclined to say that the increase in fat acidity was due to increase in moisture, but look at the sixth sample. It started with a moisture content of 6.3 per cent and only increased to 7.1 per cent but its final acidity just slightly more than doubled. I will say at this point that, after 45 days, No. 2 was poor and 6 was satisfactory. Also note Sample 8. Its original moisture was 7.2 and its final acidity was lower than the original numbers 1, 2 or 3. In spite of its high original moisture, it was satisfactory after 45 days. Note the free fatty acid of the first and fourth samples from manufacturer C. Is this variation due to a difference in the shortening or is it due to lipolytic enzymes in the original flour used in making the fourth sample?

All of these mixes were baked at the start and were judged to be satisfactory. After storage, the samples were baked and four of them failed. *Table 6* shows all the data given in *Table 5* but the values are arranged in ascending order. The figures applying to the four unstable

TABLE 6

CORRELATION OF FFA AND MOISTURE CONTENTS WITH PERFORMANCE OF CAKE MIXES

ORIGINAL		FINAL	
Moisture	FFA	Moisture	FFA
2.9	0.53	3.0	0.44
3.4	0.57	3.4	0.45
3.5	0.57	3.4	0.59
3.5	0.62	3.5	0.83
3.5	0.62	3.7	0.86
3.6	0.73	3.8	1.0
3.8	0.85	4.5	1.4
4.7	1.0	4.7	1.7
5.0	1.1	6.0	1.7
5.0	1.1	6.4	1.8
5.4	1.1	6.4	1.9
5.4	1.3	6.9	2.0
6.3	1.4	7.1	2.5
6.3	1.4	7.3	2.6
7.2	1.5	7.8	3.2
7.8	2.0	7.9	3.3
8.1	2.0	9.7	3.4
8.2	2.0	9.8	6.5
9.0	4.7	10.0	9.5

NOTE: Underlining denotes unsatisfactory performance.

cakes are underlined. It appears that one unsatisfactory sample had an initial moisture of 3.5, but the others started with moisture above 7.2 per cent. There were seven good cakes with an initial moisture of 5 per cent or higher. On the basis of these data, is there justification for specifying original moistures below 5 per cent?

There is evidently no correlation between the bad samples and initial free fatty acid values. The figures on final moisture showed no bad samples below 7.3 per cent but there was one good sample at 7.8 per cent. The only perfect correlation between keeping quality and chemical analyses shows up in the final free fatty acid values. Although no good cake had a final free fatty acid above 3.0, one mix had an original free fatty acid of 4.7 per cent and it was judged to be satisfactory. What we were attempting to do in these tests was to find means for predicting shelf life at the start. We failed. Possibly, had we measured enzyme activity, we might have been wiser. Are there other Associates who have data on this type they are willing to share?

Problem 3. The next problem is concerned with specifications for canned cakes and puddings. There are good products of this type available but how, on the basis of specifications alone, can the Quartermaster Corps be sure of receiving satisfactory ones? Most manufacturers will never knowingly put out a product below a certain standard but, unfortunately, there are a few who will, and the Institute wants to write specifications which will effectively eliminate the chiselers, but which will, at the same time, allow the legitimate operators full exercise of their individual art, ingenuity, and techniques.

Approximate prices of typical ingredients of a fruit cake are shown in *Table 7.* Obviously, if one cuts the amount of egg by 1 per cent and

TABLE 7

APPROXIMATE COST OF CAKE MIX INGREDIENTS

(cents per pound)

Flour	6	Lemon peel	26
Sugar	9	Citron peel	26
Milk solids	12	Figs	35
Raisins, unbleached	12	Pineapple	40
Raisins, bleached	14	Cherries	52
Dates, pitted	18	Pecans	90
Shortening	21	Eggs, dried	95
Orange peel	24		

FORMULAE FOR MIXED FRUIT FOR FRUIT CAKE

(Percentage composition and price per pound)

Citron peel	40	20	10
Lemon peel	20	20	15
Orange peel	25	20	15
Cherries	10	20	40
Pineapple	5	20	20
Cost	28.80c lb.	33.60c lb.	38.90c lb.

substitutes 1 per cent of flour, there is a saving of 89 cents per hundredweight. It would be difficult to show this substitution by a chemical analysis if there were several per cent of egg present. *Table 7* also shows 3 formulas for mixed fruit used for fruit cakes. These are actual commercial formulas. When citron peel is 40 per cent, cherries and pineapple are 10 per cent and 5 per cent respectively, the ingredient cost is 28.8 cents per pound, but if the citron is reduced to 10 per cent and the cherries and pineapple are increased to 40 and 20 per cent respectively, the cost rises 10 cents per pound. Which of these is actually the best buy as far as the Quartermaster is concerned?

Table 8 shows ingredient costs of two types of cakes as influenced by alteration of just two ingredients in each formula. Two formulas

TABLE 8

FRUIT MIXES FOR CAKES

(cost per unit)

ORANGE NUT ROLL				
	With Pecans		With Walnuts	
Candied orange peel	0.118	0.152	0.118	0.152
Chopped nuts	0.475	0.297	0.335	0.209
Orange juice	0.070	0.094	0.070	0.094
	0.663	0.543	0.523	0.455

FRUIT CAKE		
Cherries	0.48	0.36
Lemon peel	0.14	0.14
Orange peel	0.135	0.135
Raisins	0.11	0.1375
Currants	0.1225	0.1225
Citron	0.07	0.07
	1.0575	0.9650

for an orange nut roll using pecans are shown. There is a difference of 12 cents a unit between these; but if walnuts are substituted for pecans, a considerable reduction can be made. Actually, there is a 21 cent spread between the formula richest in pecans and the one leanest in walnuts. The second table (fruit cake) shows a case wherein raisins are partially substituted for cherries. This simple and apparently minor change (to the layman) saves the manufacturer 9¼ cents a unit of a dozen cans.

The following representatives of various manufacturers of these products met with members of the Institute in January to discuss these problems: Mr. Kennedy of Crosse and Blackwell, Mr. d'Avi of Hills Brothers, Mr. MacDonald of Burnham and Morrill, Mr. Wodicka of Libby, McNeill and Libby, and Mr. Alleman of Kroger Grocery and Baking Co. The question posed was how can we as manufacturers preserve our own artistry since there is no criterion. How can we give the right kind of product with our own particular touch and lose none of our originality and ingenuity? It is hoped that this sub-committee can continue this type of work. It is highly productive. These companies are preparing samples of various types of cakes and puddings for sub-

mission to the Institute, together with suggestions as to how specifications can be written to protect the quality-minded producer as well as the procurement officers for the armed services.

To an engineer, the writing of these specifications may not appear too difficult, but food processing is, in many respects, an art and is not susceptible to objective evaluation. In other words, there is no unit for quality. The food manufacturer who has developed his specialty to a high degree of excellence will have costs which cannot be easily explained to the uninitiated but which cannot be cut without sacrifice of quality. But to build quality into a specification without destroying the individual manufacturer's freedom to apply his particular artistry is an unsolved problem. It is the problem the Cereal and Baked Products Subcommittee is attempting to solve.

Sometimes, potential assistance comes from unexpected quarters. A professor of Food Technology became interested in one of the problems outlined in the problems booklet and asked the Associates for further information. On April 3, he wrote that some of his students were going to work on a problem "concerned primarily with canned raisin bread. We are interested in that project because it ties in with some pigment work which we are doing here." It will be interesting to see just what information will turn up as the result of investigations at this particular university, and we hope this may stimulate activity among other institutional members of the Associates.

JOHNSTON

Thank you, Dr. Peters for an excellent report! I am sorry to announce that Dr. Peters will not be able to continue as Chairman of Cereal and Baked Products Sub-Committee next year, but we do have a very fine man to replace him, John S. Andrews of General Mills who will serve as chairman. Dr. Peters has consented to help coordinate the activities as a committee member.

PETERS

I forgot to introduce the man who did all the work. Mr. Soloski, stand up!

JOHNSTON

We will go on now to the report on dairy products by Mr. Robert Remaley, The Kraft Foods Company.

Report of the Subcommittee on Dairy Products

REMALEY

Mr. Chairman, Ladies and Gentlemen and guests!

During the past year attempts were made to organize five com-

mittees to attack six specific problems which were determined by the Dairy Products Section to be problems which required coordinated aid from Industry to solve. These problems appear in the problems booklet as:

1) DOF 1 and 2—Development of Dry Whole Milk which after storage for 6 months at 100° F., will reliquefy readily with manual stirring and will more closely simulate fresh fluid milk; and development of additional specification methods for more adequate control.

2) DOF 3—Development of a Spread for Bread having a storage life of 6 months at 100° F. which will not separate on freezing, can be consumed as produced, or is readily reconstituted, and is as acceptable as 92-93 score butter.

3) DOF 4—Development of Canned Margarine with a storage life of at least 6 months at 90° F. and emulsion stability at —40° F.

4) DOF 8—Development and evaluation of specification methods for nonfat dry milk solids to determine extent of heating during processing.

5) DOF 12—Development of an Evaporated Milk which does not require turning in storage.

The organization of the Sub-committee began in August 1949. The personnel of all of the sub-committees was determined in conference with Mr. Vorhes, Acting Chief of the Dairy, Oil and Fat Products Division of the Institute. As you may not know, Carl and I fought the Battle of 39th Street together under Colonel Isker during the war. Carl has remained at the Institute since the war and has done an outstanding job of direction and coordination of the various problems in his field with Industry. I would like to point out, that of 16 projects for the Section only 6 required the aid of Industry, and all of these required industrial aid only because of lack of specific equipment at the Institute or need for cooperative work such as is involved in method evaluation.

During the past year, Dr. J. M. McIntyre joined the Dairy, Oil and Fat Products group as Chief of the Division. Mac came from the Western Condensing Company where he had been for 7 or 8 years. His commercial experience plus his educational background makes him an ideal leader for the Division. Knowing some of the problems with which he is faced, I am certain that he will welcome the full cooperation of this group. In behalf of the industries which I represent

here, I would like to state that we stand ready to offer you that cooperation on any problem in which you think we can help.

Regarding the work of the Sub-committees during this past year, progress can be reported in only two of the problems undertaken. Because of the specialization of problems the best approach seemed to be the appointment of specific task committes best qualified to undertake each problem. The remainder of this discussion will be a report of the action of each committee.

Dry Whole Milk. This task committee was formed to attack the two problems presented by the Institute—(a) the development of a better product and (b) the development and evaluation of better specification methods. The formation of this committee was complicated by the fact that there already was in existence the Coordinating Committee of the American Dry Milk Institute which had been formed at the request of the QM F&CI to coordinate industrial developments between the Industry and the Institute. As it was not the desire of anyone to form a committee for just the purpose of having a committee, it was necessary to define the functions of the new committee and to evaluate its necessity for being. It was finally determined that this committee should confine itself to specific research problems which would be defined by the committee as a whole. The committee was finally selected, and approved in December. Members of the Committee are:

Dr. A. P. Stewart, Golden State
Dr. A. H. Johnson, National Dairy Research Laboratories
Mr. E. M. Barker, Rochester Dairy
Dr. E. A. Louder, Pet Milk Company
Dr. O. F. Garrett, M and R Dietetic
Dr. J. D. Ingle, Swift and Company
Dr. R. W. Titus, Nestlé Company
Dr. B. W. Fairbanks, American Dry Milk Institute
Mr. Ray Powers, Borden Company
Dr. E. C. Thompson, Consultant, American Dry Milk Institute

Although Dr. Thompson has now retired from the Borden Company, I have invited him to remain a member of this task committee in view of his experience with the product.

The first meeting of this committee has been called for April 27th at the Institute. Delay in calling the committee together was due to the extreme geographical spread of its membership and the desire of all to keep travelling expenses of committee membership to a minimum. It was felt advisable to tie all committee meetings into other scientific or industrial meetings that would be attended by the majority of the

members. The date of the present meeting is the day following the American Dry Milk Institute meetings which are now going on.

Evaporated Milk. An attempt was made to form a task committee to work on the problem of the development of a non-separating evaporated milk. The Evaporated Milk Association offered the services of its Technical Committee to serve as this committee. A preliminary meeting was held with the Technical Committee September 27. Although considerable interest was aroused at this meeting, we were unable to form a formal task committee from its membership. We were advised later that the Evaporated Milk Association would keep the Institute advised of developments in this direction, but that because of individual company interest in this particular line of research, formation of a task committee was not possible. No further efforts have been made in this particular instance.

Margarine. A committee was formed to study the development of canned margarine having storage life of 6 months at 90° F. and stability at —40° F. The committee consists of:

L. C. Brown, Swift and Company
George Crapple, Wilson & Company, Inc.
O. J. Fiala, Durkee
A. D. Van de Evre, Armour and Company
R. J. Remaley, Kraft Foods Company

A preliminary meeting was held October 12, 1949, to lay out a program of study for solution of this problem. It was decided at the meeting that the following steps would be taken:

A. Margarine produced in accordance with definite standards would be evaluated—this margarine to approximate the old lend-lease margarines. After evaluation of this margarine was complete, modifications of the initial product would be undertaken to improve it.

B. A completely dehydrated product, but one which could be readily emulsified with water or milk would be developed.

The Kraft Foods Company agreed to make the pilot plant runs on the margarine produced by

1) Hydrogenation of all oil to 103° F.
2) Addition of totally hydrogenated oil to soft oil to raise the melting point of the mixture to 103° F.
3) Standard margarine.

Because of relocation of the Laboratory pilot plant, the runs have been delayed. As a matter of fact, the equipment is still not installed. It was decided recently that we would proceed to make the run using other equipment and this will be done in the near future.

Specification Methods, Nonfat Dry Milk Solids. The use of non-fat dry milk solids by both the Army and industry could be materially increased if the skim-milk solids were produced for specific uses. There are today two specific uses to which the Army puts skim-milk: (a) in bread to add nutritional values and (b) in combination with dry milk fat for beverage purposes in areas where fluid milk cannot be obtained. At present, soldiers stationed in the Orient are being supplied this type of milk. There are undoubtedly other uses to which the Army could put nonfat milk solids, provided that they knew the type of milk required for such use; for example, prepared cereal mixes, containing sugar and milk, combinations of coffee and milk, etc. The desire of the Food and Container Institute to obtain adequate specification methods for control of the type of milk which they procure is essential to any program involving the procurement and use of specialized milk solids.

When milk is processed into powder, the first step in a commercial operation is condensing the milk to a concentration that can be economically dried. In this operation, the milk is preheated prior to condensing. The amount or degree of preheating produces fundamental changes in the milk which make it either more or less desirable for a specific use; for example, high preheating temperatures such as 190° for 20 minutes will produce a milk which can be used in bread, one that gives good loaf volume, high moisture absorption and improved quality. On the other hand, the same type of milk is not satisfactory for reconstitution for beverage purposes. Heating milk to the temperature necessary for bread baking produces heated flavors which make the milk unpalatable for reconstitution, increases the tendency of the milk to develop stale flavors and decreases its solubility. These changes are accompanied by at least two fundamental chemical changes that occur in the milk: (a) coagulation of the albumin of the milk and (b) increase of the amount of reducing substances that occur in the milk.

At the beginning of this study, there was already in the literature the method of Harland and Ashworth for measuring the amount of soluble (non-coagulated) protein which was present in milk powder. It was felt that this method should be evaluated, and we hoped that it would prove satisfactory. Accordingly the following committee was formed to evaluate the method:

E. C. Thompson (Ray Powers), Borden Company
A. P. Stewart, Golden State Company
A. H. Johnson, National Dairy
C. A. Vorhes, QM F&CI
A. O. Dahlberg, Consolidated Dairy Products
B. W. Fairbanks, American Dry Milk Institute

The results of the initial go-around in this problem using the Harland and Ashworth method showed values on a single sample ranging from 4.4 to 6.8 with an average of all determinations of 5.9 mg. ranges of soluble protein per gram of powder.

At this time it was recommended by Dr. Stewart of Golden State that a new method be tried which would measure the amount of reducing substances present in the milk powders. Accordingly, another series of powders was sent out with the request that they be analyzed in triplicate by both the Harland and Ashworth method and the Stewart method. To date only 4 of the laboratories have sent in their results. Of the four reporting, fair correlation was found among 3 laboratories using the Stewart method and poor correlation found where the Harland and Ashworth method was used. The four laboratories reported the following:

Stewart Method

	Lab. 1.	Lab. 2	Lab. 3	Lab. 4	Average*
Low heat	23.0	21.1	22.3	9	22.3
Low heat	26.0	24.7	25.0	12	25.2
High heat	51.8	48.9	39.8	36	46.8

*Laboratory No. 4 omitted from average.

As the problem now stands, it appears that the Stewart method should have further evaluation. It is suggested that future work in this problem should revolve around the evaluation of this method and the possible enlarging of the committee to obtain adequate information as to its validity as a specification procedure.

Army Spread. The problem which the Food and Container Institute presented to industry was the development of a spread for bread having a storage life of 6 months at —40° F. This limited the development to a study of dehydrated spreads for bread. A committee composed of Dr. A. M. Swanson, University of Wisconsin, and myself was organized. This committee was limited inasmuch as a considerable amount of screening work was necessary during the early stages of development. In all probability, after more data have been obtained in the present series, the committee should be expanded.

Inasmuch as the old war-time product, Army Spread, lent itself to dehydration, it was determined that the initial runs would approximate the Army Spread formula. After a series of preliminary discussions, initial drying experiments were run at the University of Wisconsin on October 5th. Two runs were made:

Run No. 1 *Original Army Spread Formula*
Fat 79 per cent
Moisture 1.6 per cent
Run No. 2
Fat 65 per cent
Moisture (approximately 1.6 per cent)

The low fat product developed a stale flavor very shortly after drying. The high fat product appeared to have the greatest possibilities for future study. Considerable difficulty was experienced during drying of the high fat product due to the design of the drier. It was determined that a drier capable of discharging continuously without the use of a cyclone collector and immediate cooling of the product was essential. This required modification of the Wisconsin drier and the use of an attachment to the Kraft pilot drier at Glenview. It was decided that the next runs would be made at Glenview following the construction of an attachment that would bypass the existing collection system. Such a unit was designed and approved. On March 9, the second series of three runs was made in the Kraft Laboratory.

Run No. 1 *Regular Army Spread*
Fat 82.0 per cent
Moisture 0.37 per cent
Run No. 2
Fat 84.7 per cent
Moisture 0.47 per cent
Run No. 3
Fat 86.8 per cent
Moisture 0.38 per cent

These runs were all identical except for modifications of the formula. Run No. 1 was regular Army Spread; Run No. 2 identical, except the skim-milk powder was eliminated, and Run No. 3 was identical to Run No. 2, except that dry milk fat was substituted for the butter. Emulsifier was added to both Run No. 2 and No. 3. All products were packaged under nitrogen at levels below 1 per cent of oxygen. Samples have been placed in storage at

70° F.
90° F. } Glenview

100° F.
—20° F. } Quartermaster Food and Container Institute

0° F. } University of Wisconsin

Inspection will be carried on periodically by the staffs of all three laboratories. Samples of the product, both reconstituted and in powder form, will be available for inspection at the Round Table this afternoon. *Figure 4* shows the finished product alongside the dry product. All of the products from the runs reconstituted readily; those with emulsifiers

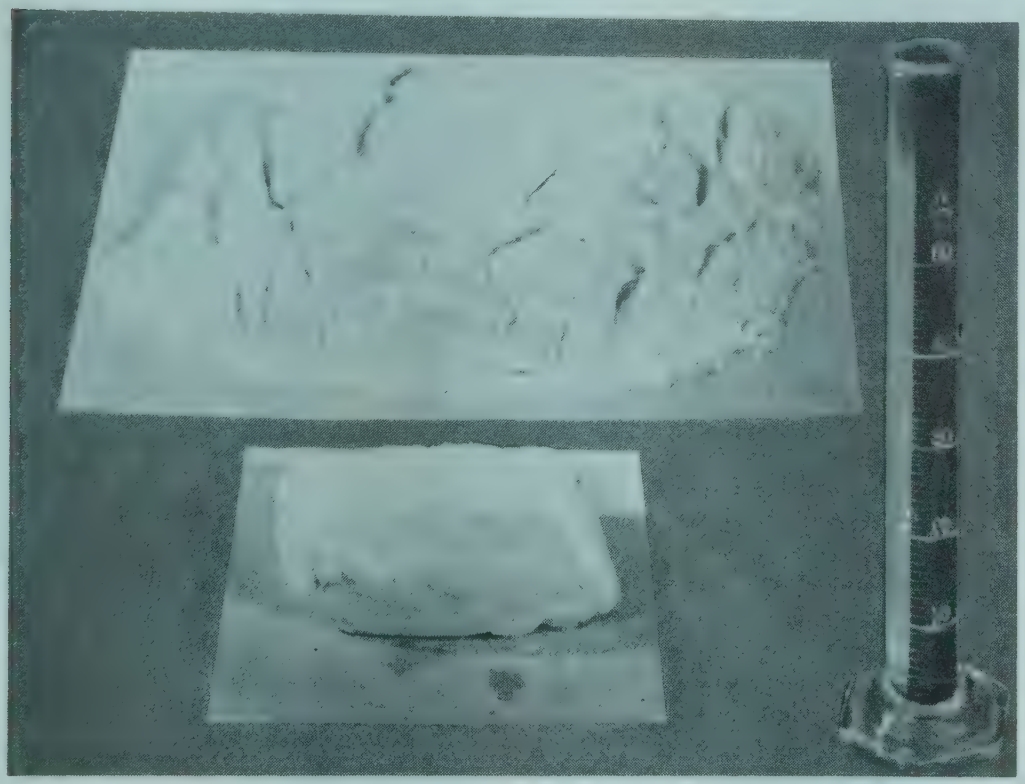


FIG. 4. Dehydrated Army Spread. (Dry, water and mixed.)

reconstituted more readily than those without. Initially the flavor of Run No. 1 was preferred over No. 2 or No. 3 in this series. From the experimental runs made, it is obvious that immediate cooling below 70° F. of the product would be essential to production.

It is felt that the runs made to date have accomplished the following:

a) Demonstrated that products having 80-85 per cent fat can be dried in modified conventional spray driers.

b) Demonstrated that moisture of less than 0.5 per cent can be obtained in such a product commercially.

c) Demonstrated that the fresh product will readily reconstitute into a palatable product, and that the addition of emulsifiers will aid such reconstitution.

d) Shown that the products can be packed under nitrogen at levels well below 1 per cent oxygen.

It is hoped that these runs will also show whether the moisture level and the 0_2 level are sufficiently low to protect the product from staling and oxidation; whether the addition of skim-milk powder is beneficial or detrimental to the product; and whether the non-fat solids normally present in butter are of significance to the keeping quality of the product. Examinations of all samples will be monthly except for those stored at sub-zero temperatures. These will be examined bi-monthly.

Looking back over the past year, I am afraid that the accomplishments of the various task committees of the Dairy, Oil and Fat Subcommittee of the Activities Committee have not reached the point I had hoped they would at this time last year. The mere mechanics of organization have consumed a large portion of our time. However, a few positive results have been obtained. I am hopeful that these will point toward solutions of the problems. It is my recommendation that the Task Committees already formed be authorized to continue their efforts for another year in essentially the same form as they exist today.

In conclusion I want to thank Colonel Kujawski, Mr. George Gelman, Dr. Lightbody, Dr. Fevold and all of the members of the Institute staff for their cooperation during the past year. In particular I would like to commend Mr. Vorhes and the Dairy Products Division for their splendid efforts in making it possible for the committee to have accomplished what it did.

JOHNSTON

Thank you Mr. Remaley for your excellent review of the year's work of your Sub-committee. We will now pass on to the report on Fruit and Vegetable Products by Mr. John T. Knowles, Libby, McNeill & Libby.

Report of the Subcommittee on Fruit and Vegetable Products

KNOWLES

Mr. Chairman, Ladies and Gentlemen and Guests!

The Sub-committee for fruit and vegetable products, like other groups within the Activities Committee, began its operations facing an imposing list of problems in military subsistence which all of you have seen.

At the outset, the committee decided to borrow an established technique from industrial research; namely, to choose a problem which appeared to be within its capacity, and to concentrate effort on solving this one problem. If this effort were successful, it would not only remove one problem from the list, but would also pave the approach to the next by developing the necessary working relationships, methods, and pattern of procedure.

The problem chosen was, on the face of it, very simple. The U. S. Air Force desired to serve a cup of hot soup to passengers and crew members travelling on multi-passenger planes. The planes are provided with electric heating equipment, and it would appear that nothing could be easier than to open a can of soup, heat it, and serve it. The same operation is conducted thousands of times every day in public eating places all over the country, and no quick-lunch counter can be considered complete without a varied stock of cans of good soup.

Unfortunately, in the Armed Forces, things are not that simple. The Congress has decided that while the country is not actively engaged in armed conflict, negotiated purchase of government supplies will not be permitted. With certain limitations, not particularly pertinent to this case, contracts must be awarded to the supplier submitting the lowest bid on a product which will comply with the appropriate specification.

Those of you with experience in peacetime government procurement may now begin to discern the outlines of the problem. So that you may see the shape of it more clearly, I quote the major provisions of the existing soup specification:

"Grade—Shall be of high grade.

C. Material and workmanship

C-1. Shall be of best quality and prepared in accordance with best commercial practice, under strictly sanitary conditions, and shall be free from adulteration and impurities.

C-2. Shall be prepared from best quality, clean, sound vegetables, spices, and other material peculiar to the variety of soup desired, and if containing meat or meat products, such meat or meat products shall only be such as shall have received and passed United States Government inspection.

E. Detail Requirements

E-1. Canned soups shall be well concentrated and shall have a good flavor.

F. Method of inspection and test.

F-1. Inspection shall be made at point of delivery by the receiving agencies, unless otherwise specified.

I. Notes

I-5. It is believed that this specification adequately describes the characteristics necessary to secure the desired material and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids,

and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects."

The specification contains other provisions, of course, but beyond requiring compliance with the Federal Food and Drug Act of 1906, they have no particular bearing on the soup.

It is not hard to see that expert chefs or advanced food technologists would not be needed to produce a canned soup complying with these specifications. Coupling this specification with the government's peacetime requirement to accept the lowest competitive bid meeting this same specification, it is immediately evident that those Air Force passengers mentioned earlier would very likely be subjected to something of lesser quality than wartime GI canned soups. To prove the point I offer the following experience:

The Quartermaster Corps actually made a soup procurement under these existing specifications about a year ago. *Figure 5* indicates the

FIG. 5. Comparison of commercial brands of chicken noodle soup.

pronounced variations in the solids ingredients of four samples of chicken noodle soup submitted for this procurement. It can be seen at a glance

that there are more noodles in some than others, and hence less chicken, and there are variations in sizes of the chicken meat. *Figure 6* gives us

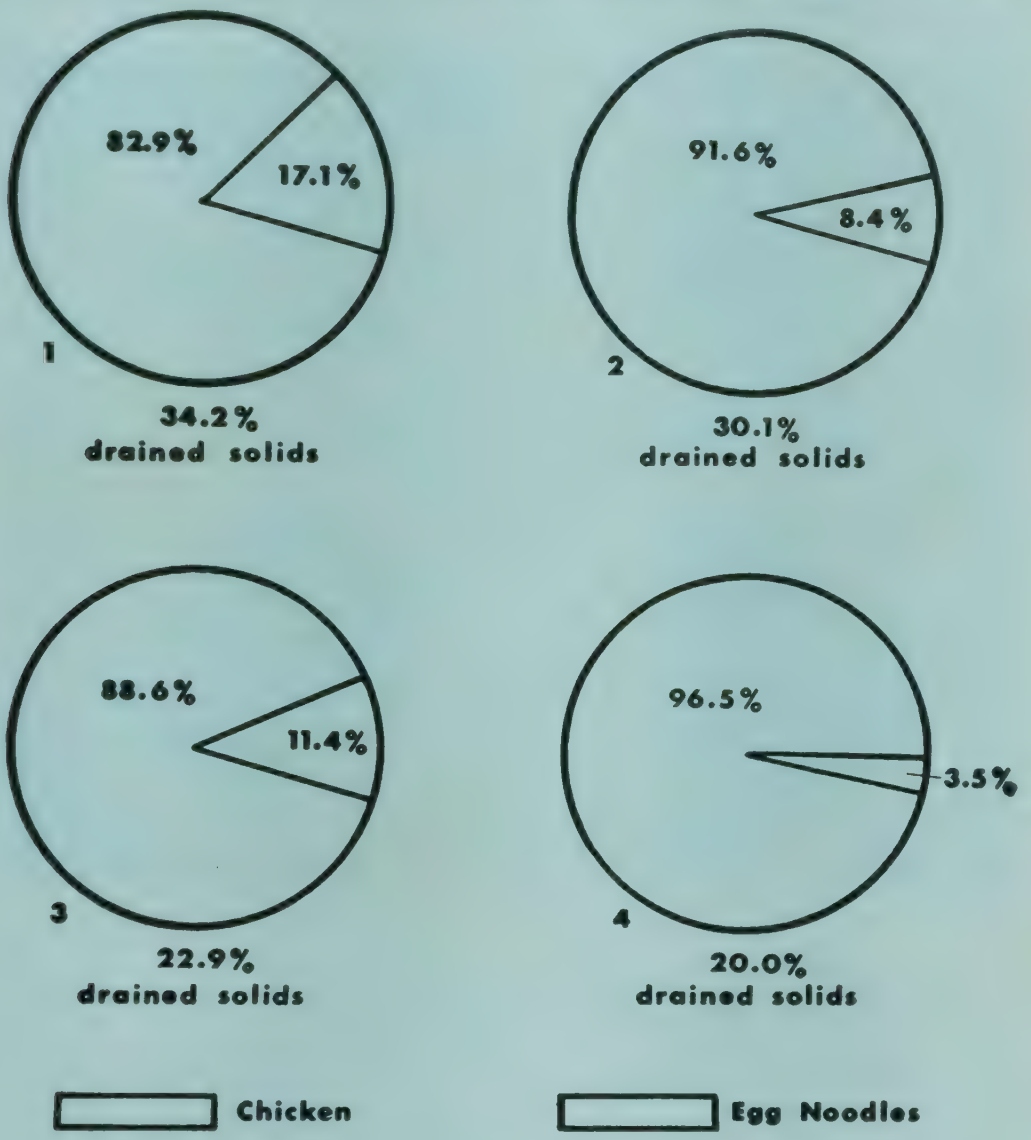


FIG. 6. Graphed data on chicken noodle soup.

an accurate summary of these variations in solids.

For instance, *Figure 6* indicates the total drained solids of each sample, and the variation is from 20 per cent to 34.2 per cent. In analyzing these solids further, we found that the chicken content varied from 3.5 per cent to 17.1 per cent, which means the remaining noodles constituted from 96.5 per cent down to 82.9 per cent of the total solids. (All four samples ostensibly met the existing soup specification, but that 3.5 per cent chicken sample should be the lowest in cost of the lot, and consequently the dish our air force guests will rate).

So much for chicken soup! The committee next tried vegetable beef soup and basically of course, the experience was similar. There is some variation shown in *Figure 7* but I want to call particular attention

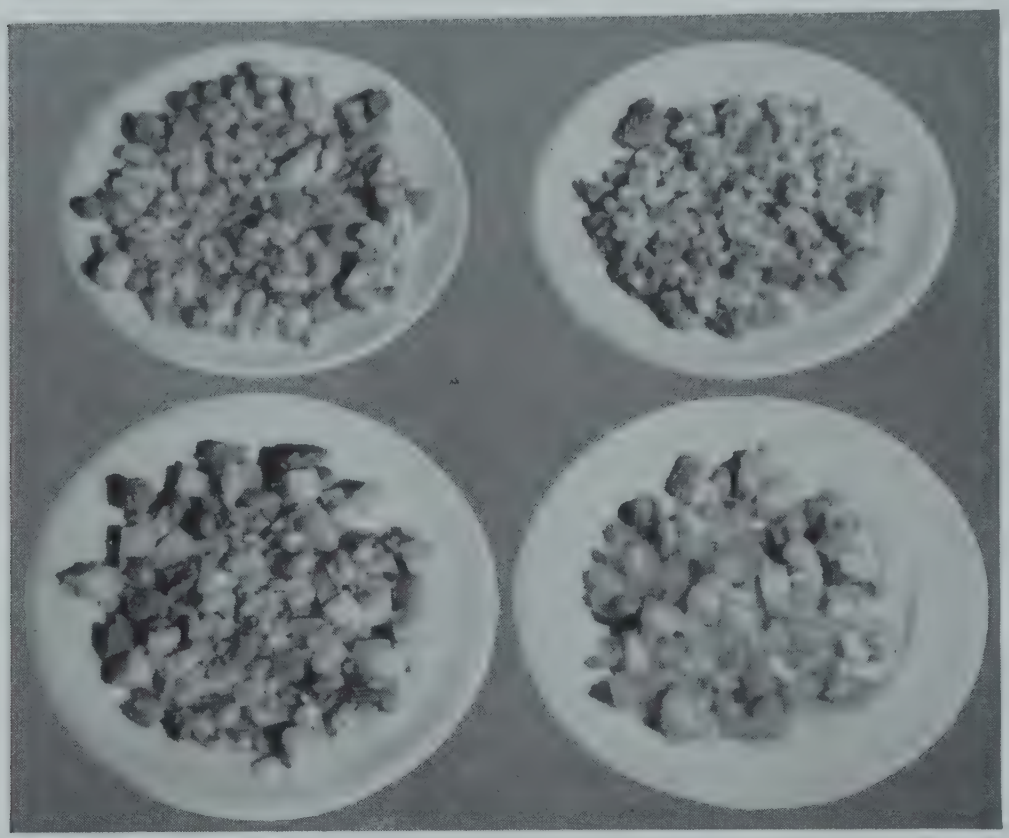


FIG. 7. Comparison of commercial brands of vegetable beef and vegetable soup.

to this sample in the southeastern corner (lower right). This particular can contained no beef whatever, but aside from this, there was actually less variation than in the chicken noodle soup, as the total solids varied only from 26.3 per cent to 30.8 per cent. The spread between minimum and maximum meat content was greater than in the chicken soups because we found a 20 per cent range from 6.9 per cent to 26.9 per cent, as you can readily note from *Figure 8*. Now we know what the problem looks like. There was obviously a definite need for a specification which would insure the delivery of soups of uniformly good quality, and of such type that the manufacturers of commercial soups of good quality could supply their regular commercial products with little or no formula change.

Getting to know the problem, however, is still a long way from mastering it. Although many scientific principles may be involved, they have largely been reflected in a technology which, at least in broad

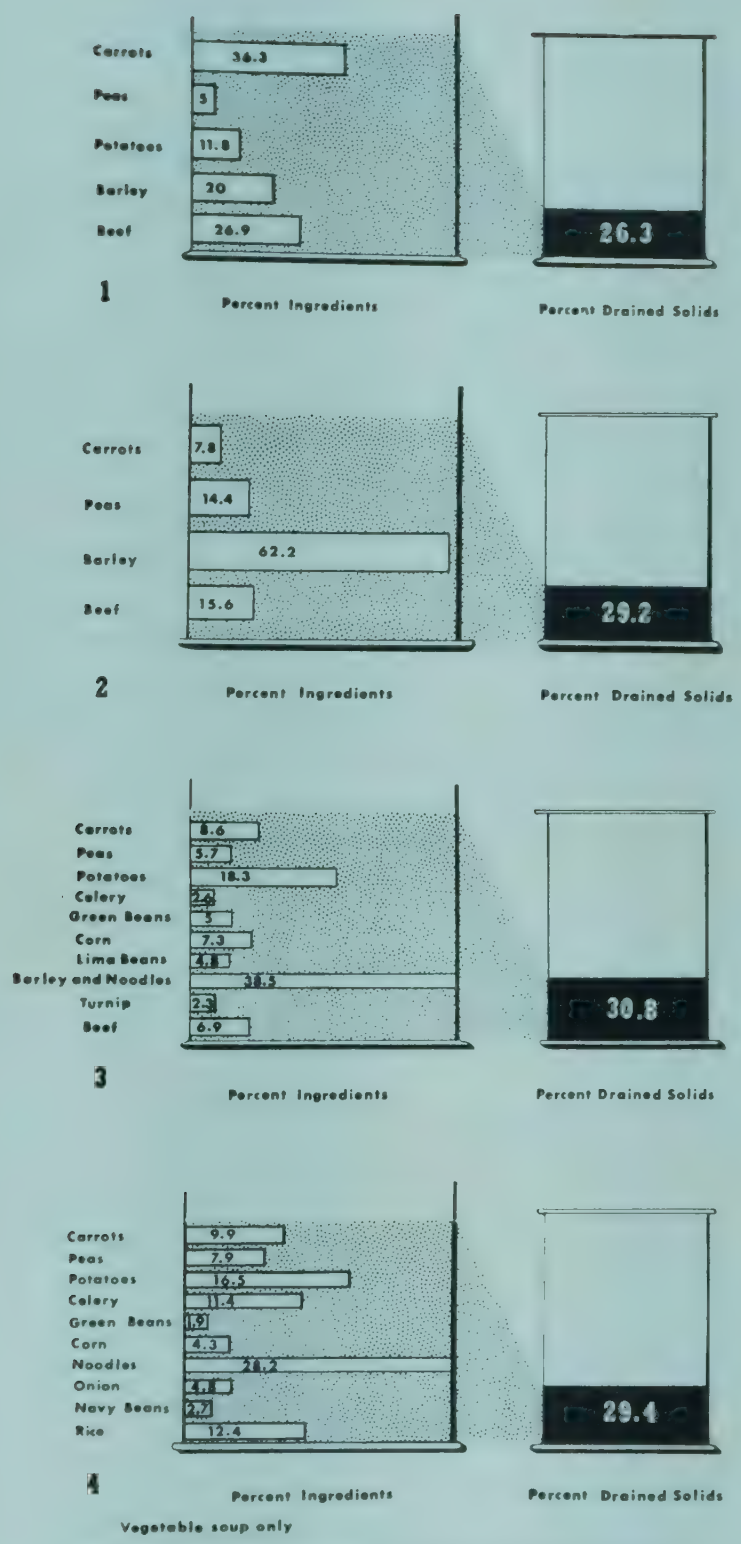


FIG. 8. Graphed data on vegetable soup with beef.

outline, is widely known. The real secret of quality lies in the manufacturing art, and in manufacturing, art is generally secret.

It was immediately realized that the only practical approach was for the committee to draft its own formulas for the various types of soup desired. With this in mind, the wisest course appeared to be to form the working committee from people who were outside the soup industry, but who were sufficiently familiar with the basic technology involved to have constructive suggestions, and this was actually accomplished.

Members of the Fruit and Vegetable Products Division of the Institute then studied good commercial samples of canned soups in their laboratories and arrived at tentative formulas for the most important types of soup desired. On the basis of this information, they made up laboratory batches of canned soup and submitted them for criticism at a meeting of the committee. In this first array of samples, key ingredients in the formula were used at several levels in the various batches. This made it possible to arrive at specification limits for these ingredients in the discussion at this first meeting.

In that the quality of a formulated product of this type rests on the quality of a large number of individual ingredients, there still remained the problem of specifying ingredient quality. Fortunately, this task had largely been done by other agencies through the preparation of other specifications and U. S. standards for grades. Institute personnel, after the agreement on formulas, prepared a first draft of the proposed specification and sent it, along with the reference documents specifying ingredients, to the members of the committee. Another meeting was held after the members had had an opportunity to study the draft.

This meeting of the committee with the group at the Quartermaster Food and Container Institute exemplified the great advantages of handling at least certain phases of similar developments by meeting rather than by correspondence. Many of the ideas of the individual members of the group, arrived at through previous study of the draft, had definite point, but were modified and strengthened by the ideas of others which were stimulated to expression by the discussion and which probably would have been missed had the review been entirely by correspondence. In that the committee members were not directly involved in the soup industry, they had relatively few secrets to guard, and the discussion was consequently quite free.

On the basis of the revisions suggested at the meeting and the resulting subsequent investigations, a second draft of the specification was prepared. This draft has now been sent to the major companies engaged in the manufacture of canned soups, and their reactions are being awaited.

To review our present position, we faced the problem of defining the quality of an item on which we should obviously expect little assistance on critical points from the manufacturers, but we have nevertheless arrived at a specification which we believe the present manufacturers can discuss with the Armed Forces in concrete detail without risking disclosure of valuable and competitive manufacturing data. We believe that in this way it is possible to obtain the active cooperation of the technologists within the industry without requiring them to compromise their own positions and responsibilities. When the results of this approach become known, we hope that the experience may prove of value to others of you who are facing similar problems. It is apparent, I believe, that we have initiated an action that will result in the Government's getting more—and legitimately so—for its dollar.

Gentlemen, this concludes my report! If the philosophy and the program I have summarized here today contain merit and do in fact produce the benefits we expect, the Institute can thank the so-called working members of the committee who have, in my opinion, performed their functions in an exceptionally constructive and cooperative manner. They have completed the very tedious and arduous task of detailed selection of many, many factors bearing on numerous product specifications—many of which I have not even mentioned. These are the men who deserve particular commendation at this time:

Dr. J. R. Wagner, Head, Fruit and Vegetable Products Division, QM F&CI.

Mr. R. Murray, Continental Can Company

Mr. L. G. Germain, American Can Company

Dr. H. D. Lightbody, Director of Research, Food Laboratories, QM F&CI.

Mr. A. C. Rauch, Technologist, Fruit and Vegetable Products Division, QM F&CI.

Mr. J. W. Hanley, Libby, McNeill & Libby

Mr. V. O. Wodicka, Libby, McNeill & Libby

There is one member of this group which you gentlemen know well in another capacity. I refer to Dr. J. R. Wagner, who is also Institute coordinator of this committee. He has rendered exceptional service in both capacities.

JOHNSTON

Thank you very much for a fine report, Mr. Knowles! We will now hear about the accomplishments of the General Products Sub-committee from Mr. Charles W. Kaufman.

KAUFMAN

Mr. Chairman, Ladies and Gentlemen and Guests!

I would like to open this meeting by introducing Dr. Kenneth T. Farrell, Chief of the General Products Division of the Food and Container Institute. Much of the work that I am about to report on has been very largely carried out under Dr. Farrell's supervision.

Some of you may wonder just exactly what the General Products Division includes. I like to think of it as being a bit like Fibber McGee's closet,—everything that cannot be fitted into one of the other divisions winds up in the General Products Division. At the present time it includes over forty separate items. There are, incidentally, only two men with full time assignment in this Division carrying the responsibility for these entire forty products. A graphic representation of this situation is shown in *Figure 9.*

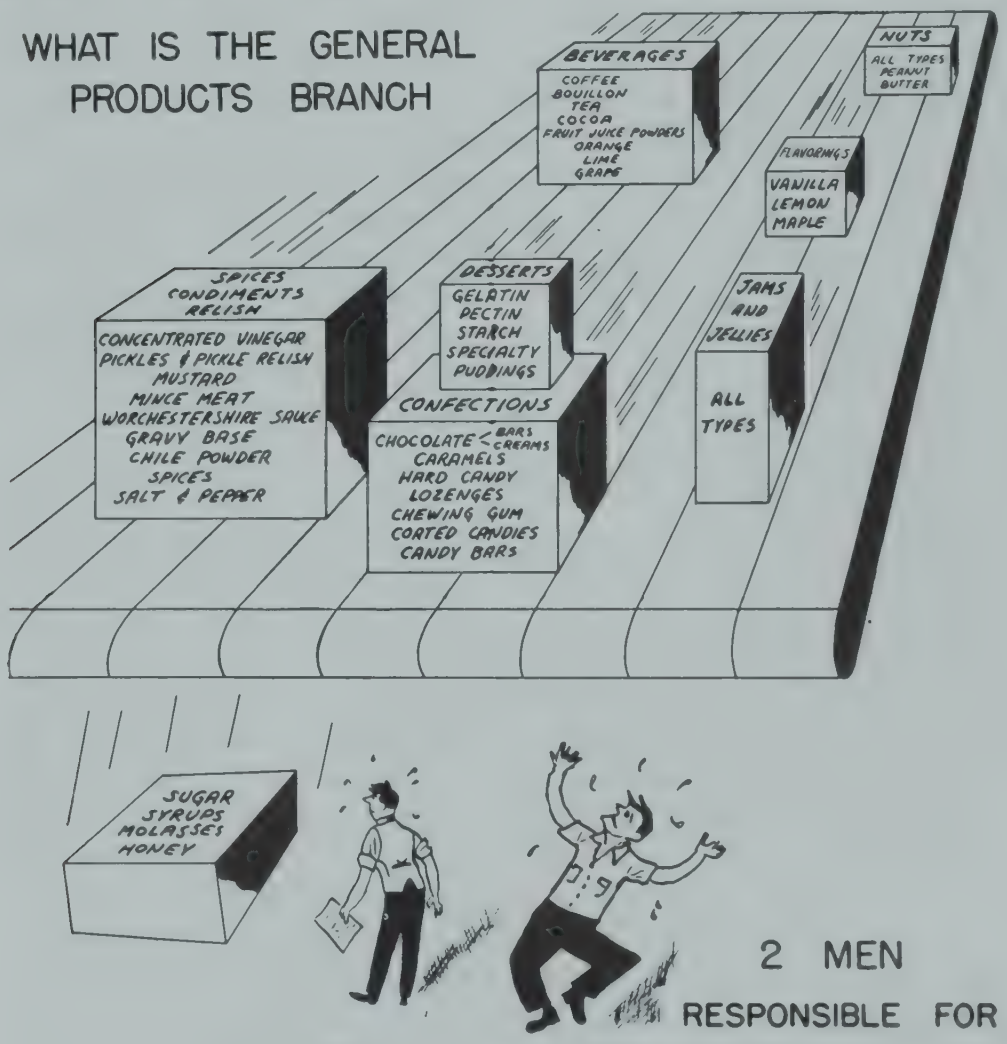


FIG. 9. What is the General Products Branch?

Our objective, therefore, in approaching problems within this area has been to pick the more important and to eliminate as many of the lesser items as possible. The number of man-hours is severely limited.

Table 9 shows the items on which we have worked. The items marked with one asterisk have been handled by organizing committees

TABLE 9

PRODUCTS AND PROBLEMS STUDIED DURING 1945-1950 COOPERATIVELY BY INSTITUTE AND ASSOCIATES

1. Better Soluble Coffee*
2. Confection Specifications**
3. Black Pepper Synthesis*
4. Mustard—Worcestershire Sauce Specification
5. Table Syrup Specifications and Problems
6. Salt Specification*
7. Coconut Specification
8. Dessert Specification

*Handled by organizing Industry Committee.

**Handled by National Confectioners Association. All others by personal correspondence between chairman and Institute or chairman and industry.

from industry, and we have had nothing but the finest cooperation from our Committees. That item marked with a double asterisk has been handled by a Committee organized by the National Confectioners' Association without any urging from the Associates' Chairman. All other items not marked in any manner have been handled by direct correspondence between your Chairman and the various manufacturers.

Probably the first and most important job which this group has undertaken during the last year was an evaluation of soluble coffee. The Institute already had as an objective for this project the preparation of a soluble coffee which was the equal of freshly brewed coffees. As there was some difference of opinion as to the extent to which present soluble coffees met this objective, a large consumer test was organized using the Great Lakes Naval Training Station group as guinea pigs. *Figure 10* shows the coffee test under way. The objectives of this particular test are:

1) To determine the acceptance level of commercial soluble coffee as used by service men under usual meal time conditions and without their being aware that soluble coffee was being served.
2) To determine this acceptance level with particular reference to that of brewed coffee.

FIG. 10. Great Lakes Coffee Test.

3) To determine whether acceptance of soluble coffee varies with the service men's age or their length of service.

4) To determine quality relationships among commercially available brands of soluble coffee that might give some indication as to superior types of coffee or methods of manufacture.

The results of the data are shown in *Tables 10 and 11*. The conclusions are rather obvious and need no further comment from me.

TABLE 10

MEAN PREFERENCE RATINGS AND PER CENT OF RATINGS IN DISLIKE RANGE

Coffee	N	Mean Preference Rating		Per Cent of Ratings in Dislike Range
Control	2571	5.79	Not	22.8
A	380	5.73	Significant	25.2
B	472	5.58	Difference	25.2
C	378	5.57		27.5
D	392	5.55		27.1
E	537	5.47	Significant	30.2
F	462	5.40	Difference at	28.3
G	501	5.24	1% level	32.8
H	549	4.34	Unacceptable	49.0

TABLE 11

MEAN PREFERENCE RATINGS AND PER CENT OF RATINGS IN DISLIKE RANGE ACCORDING TO AGE GROUP FOR COMBINED CONTROL AND COMBINED SOLUBLES

Age Group	N	Mean Preference Rating	Per Cent of Ratings in Dislike Range
Control:			
Under 20 years	1566	5.91	20.2
20-24 years	659	5.73	24.4
25-29 years	79	5.10	34.1
30 years or over	47	5.04	38.4
Total	2351	5.81	22.2
Soluble:			
Under 20 years	2371	5.46	29.0
20-24 years	1045	5.10	35.7
25-29 years	150	5.33	27.3
30 years or over	72	4.94	40.3
Total	3638	5.34	31.1

It would appear, however, that in laying one ghost, we have created another; namely, whether the Institute should not have a project on the improvement of brewed coffee.

Another phase of this coffee work has had to do with the accumulation of analytical information to be later used as a basis for developing a specification. *Table 12* shows the type of information that we have been developing on caffein. There is much data on the chart, and it is included simply to show the pattern which has been followed. Similar analytical information is available on other chemical factors and chemical methods which may eventually be important in a finished soluble coffee specification. At the present time a tentative specification has been practically completed; it will probably be submitted to the industry for comment in the near future.

Another problem which was attacked in similar manner was that of synthetic pepper. It was felt at one time that the development of synthetic pepper was of prime importance in alleviating a possible wartime shortage. However, taste tests, following the pattern developed for coffee, have demonstrated that pepper is not for many people an abso-

TABLE 12

CAFFEINE ANALYSES — SOLUBLE COFFEE

Method	Green Coffee		Brewed Coffee		Soluble Coffee A		Soluble Coffee B		Soluble Coffee C		Soluble Coffee D	
	Average	Range	Average	Range	Average	Range	Average	Range	Average	Range	Average	Range
Fendler-Steuber												
		1.555		5.32		4.03		2.70		4.875		3.86
Gravimetric	1.295		5.205		3.60		2.13		4.14		2.96	
		1.12		5.12		3.33		1.84		3.70		2.47
		1.225		5.15		3.42		1.77		3.795		2.505
Titration	1.15		4.76		3.28		1.73		3.33		2.45	
		1.08		4.26		3.18		1.68		2.63		2.36
Bailey-Andrews												
		1.545		5.41		4.32		2.62		4.735		3.625
Gravimetric	1.175		5.236		3.91		2.25		4.42		3.24	
		0.76		4.945		3.43		1.90		3.915		2.515
		1.26		5.29		3.39		2.13		3.795		2.58
Titration	1.093		4.958		3.27		1.85		3.587		2.37	
		0.83		4.62		3.115		1.58		3.24		2.21
		1.225		5.52		3.53		1.985		3.815		2.55
Spectro-Photometric	1.22		5.268		3.45		1.93		3.78		2.48	
		1.215		5.015		3.37		1.88		3.735		2.45
		2.14		98.82		3.50		2.95		2.73		2.98
Moisture	1.93		98.71		3.14		2.667		2.24		2.82	
		1.65		98.64		2.89		2.49		1.87		2.60
Yield												
Soluble Coffee Based on B-A Method Dry Weights			22.0%		33.6%		29.4%		30.4%		23.4%	

lutely irreplaceable essential in the diet. As a result, this project as originally planned has been discontinued. The Quartermaster group, however, will maintain an active interest in synthetic pepper and will attempt to evaluate any samples submitted to them by manufacturers.

Our third problem had to do with a specification on industrial salt going into baked goods. This problem was attacked by organizing a Committee through the National Salt Producer's Association. The problem has been reviewed with the Committee. The basic data for redefining a new specification is available, and it is hoped that this specification will be ready for issue shortly.

I mentioned earlier the fine work which has been done on the various candy specifications. This work, carried out in cooperation with the National Confectioners' Association, has resulted in a number of new and vastly improved specifications on several different types of candy. However, there are still several unsolved problems in this area which are very serious. Two of these problems, as illustrated by *Figures 11 and 12,* are what we call "Bloom on Chocolate," and "Oiling Out of

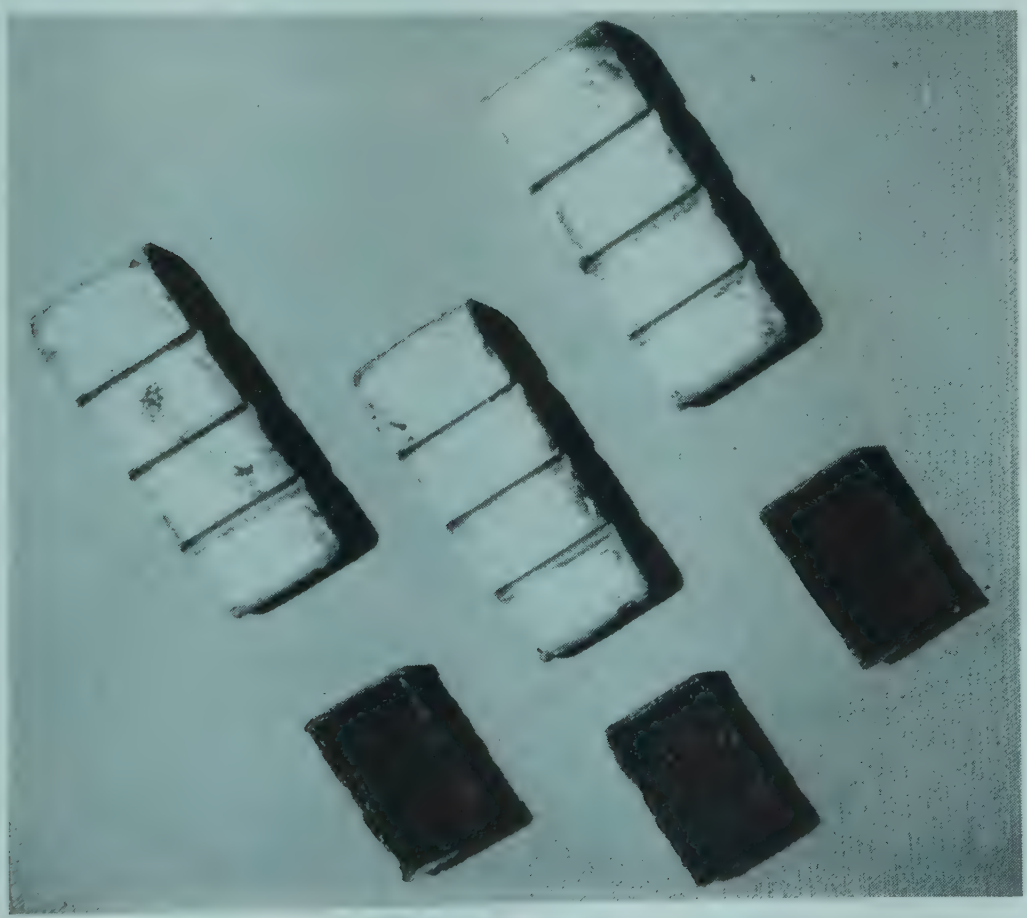


FIG. 11. Chocolate bloom.

FIG. 12. Oiling out of sweet chocolate.

FIG. 13. Soup Stock Base.

Sweet Chocolate." These problems, very serious for the Armed Forces and for industry, have yet to be solved.

In approaching another problem, that of a specification for the components of blended syrups, we worked closely with the sugar companies, who have very graciously provided us with samples and analytical information on the different grades and types of refiner's syrups which they manufacture. Methods have also been accumulated for measuring these various differences, and it is hoped that we will soon be in a position to issue a revised specification leading to improved table syrups for the Army. In this case the improvement is largely due to better control of the raw material going into the syrups.

Another problem. When the Animal Products Division developed boneless beef they solved *their* problem but created one for the General Products Division. With bones no longer available, the question of soup stock and gravy base had to be approached somewhat differently. A very satisfactory product has been worked out *(Figure 13)* and a specification has been written.

The preparation of *Figure 14* was prompted by a comment of Colonel Kujawski several months ago. He asked if I would attempt to present to you in some way the extent of help and cooperation which the

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Chicago

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FIG. 14. Cooperation given to the Institute by the Associates.

Associates have been able to bring to the Institute problems. I think the figure is self-explanatory and needs no further comment. But I cannot close this report without complimenting the Institute group for the very fine job they have done, independently of the Associates.

As Chairman of this particular Sub-committee of the Associates, I would like to add that we have had nothing but the finest kind of co-operation from the various industries with whom we have had to work.

It has been a very great pleasure to work with the Institute during the past year on these problems.

JOHNSTON

Thank you very much for an excellent report. We will now hear Mr. Croy report on the accomplishments of Flexible Containers Sub-committee. Mr. Croy!

Report of the Subcommittee on Flexible Containers

CROY

Mr. Chairman, Ladies and Gentlemen and Guests:

In June 1949, the chairman of the Sub-committee on Flexible Containers met with representatives of the Container Laboratories, Quartermaster Food and Container Institute to discuss the development of new testing procedures and/or modifications of existing testing procedures for determining the suitability of containers for shipment, storage, and handling at temperatures as low as minus 80° F.

As a result of this meeting, there was established a committee consisting of seven industry representatives of the various fields connected with flexible packaging and one member representing the Quartermaster Food and Container Institute. The committee personnel is:

Paperboard industry: Mr. F. D. Long, Container Corporation, Chicago, Chairman

Paper industry: Dr. Linton Simerl, Marathon Corp., Menasha, Wisconsin

Cellophane industry: Dr. Nelson Allen, Cellophane Division of the E. I. du Pont de Nemours & Company, Wilmington, Delaware

Pliofilm and Other Transparent Materials Industry: Dr. Wm. Aiken, Goodyear Tire & Rubber Co., Akron, Ohio

Metal Foil Industry: Mr. T. M. Hill, Aluminum Co. of America, Pittsburgh, Pennsylvania

Adhesive Industry: Mr. S. F. Thune, National Starch Products, Chicago, Ill.

Petroleum: Mr. F. H. MacLaren, Standard Oil Company, Whiting, Indiana

Also as secretary of committee: Mr. Frank Rubinate, Quartermaster Food and Container Institute, Chicago, Illinois

This committee convened at the Institute in October 1949 and a course of action was outlined.

As a result of the meeting, tests were conducted on various packaging materials, using a Scott tensile tester to determine tensile strength and elongation, and the Beach puncture tester to determine resistance to impact. The materials were tested and compared at various temperatures from room temperature down to minus 40° F. Tensile and elongation were limited to minus 20° F. because of failure of the Scott tensile tester to operate below this temperature.

The photograph in *Figure 15* was taken in the Quartermaster Food and Container Institute Cold Chamber, which can be operated at minus

FIG. 15. Cold room (rotary drum).

40° F. to show the conditions under which the tests were run. This temperature can be maintained for only a few days at a time. On the left in the photograph is the Scott tensile tester on which tensile and elonga-

tion tests were made. To the right is shown the 3½-foot revolving drum which was built at the Quartermaster Food and Container Institute. It is a ½ scale reproduction of the standard 7 foot revolving drum used for rough handling tests of shipping containers. Construction of the drum was completed too late for use prior to this report. You will note that the technician is dressed in typical Arctic clothing, necessary for low temperatures.

The effect of adding plasticizers to a homogeneous, non-fibrous material is shown in *Figure 16.* Material C (identified by dots) is

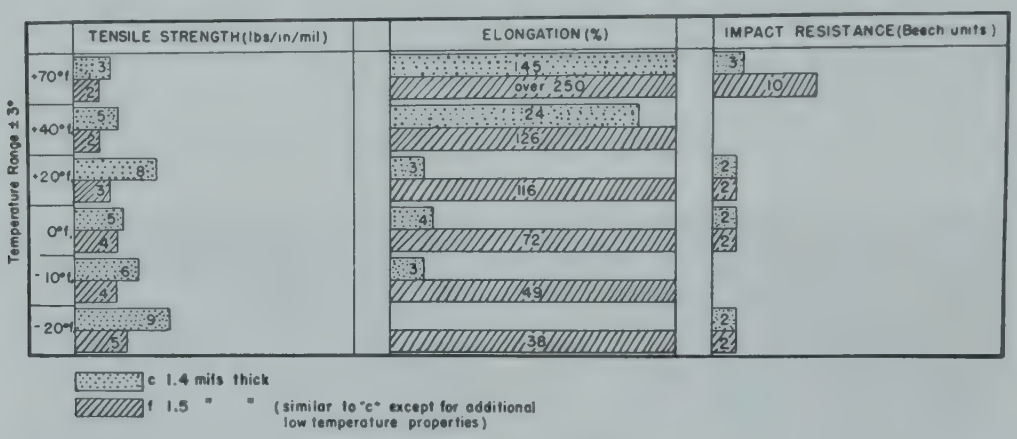

FIG. 16. Effect of plasticizers.

compared with the same basic material (diagonal lines) treated to withstand low temperatures and used for packaging frozen foods. The following points, common to all charts, should be kept in mind;

a) Figure shown on bar indicates test value. Tensile report on 1 millimeter basis for purposes of comparison.

b) Figure for elongation and impact resistance are actual values.

c) Since some values are small, the scale has been enlarged for purposes of comparison.

The chart in *Figure 16* indicates that the tensile strength of plasticized material is lower than the plain but the elongation is higher, and that the plasticizer has neglible effect on the impact resistance except at plus 70° F.

The effect of laminating on a homogeneous, non-fibrous material is shown in *Figure 17.* Material C (shown in dots and the same as shown in *Figure 16*) is compared with a lamination consisting of two sheets of the same material (diagonal lines). Again the tensile of the laminated sheet is lower than the single sheet except at plus 70° F. and minus 10° F., but the elongation is greater. Laminating also improves the impact resistance. The effect of coating a homogeneous, non-fibrous

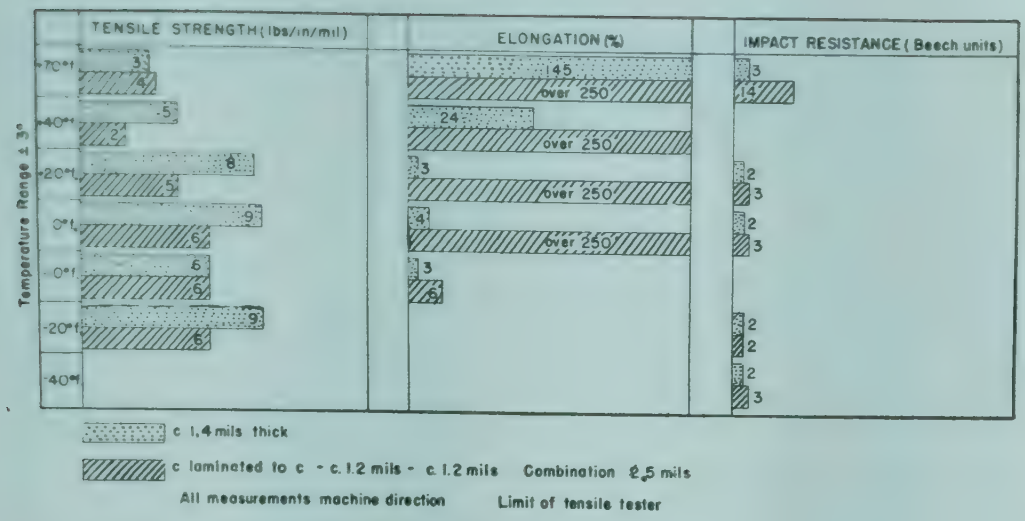

FIG. 17. Effect of laminating.

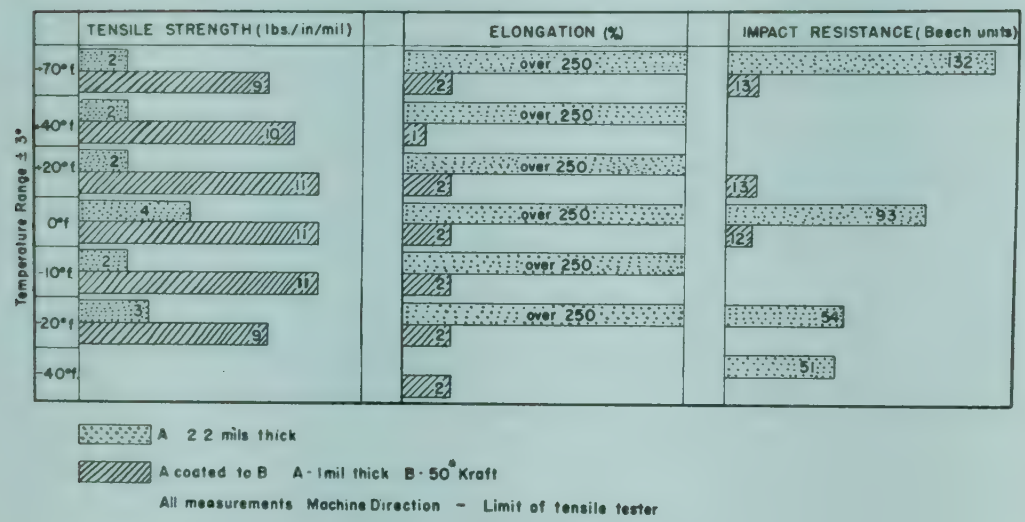

FIG. 18. Effect of coating.

material on kraft paper is shown in *Figure 18*, which compares material A (shown in dots) with the same material when applied as a coating on kraft paper (shown in diagonals). The kraft paper adds greatly to the tensile strength of the combination A, and indicates that elongation properties are lost when material is coated on kraft paper. The elongation of material A is beyond limit of machine. *Figure 19* shows tests on various liner boards and paper, comparing three types of container board shown in dots, diagonals, and dashes, respectively, and indicating slight differences in the values of tensile or elongation properties.

The problem on which I have just reported is the most important problem coming under Flexible Packaging. I wish to call your attention

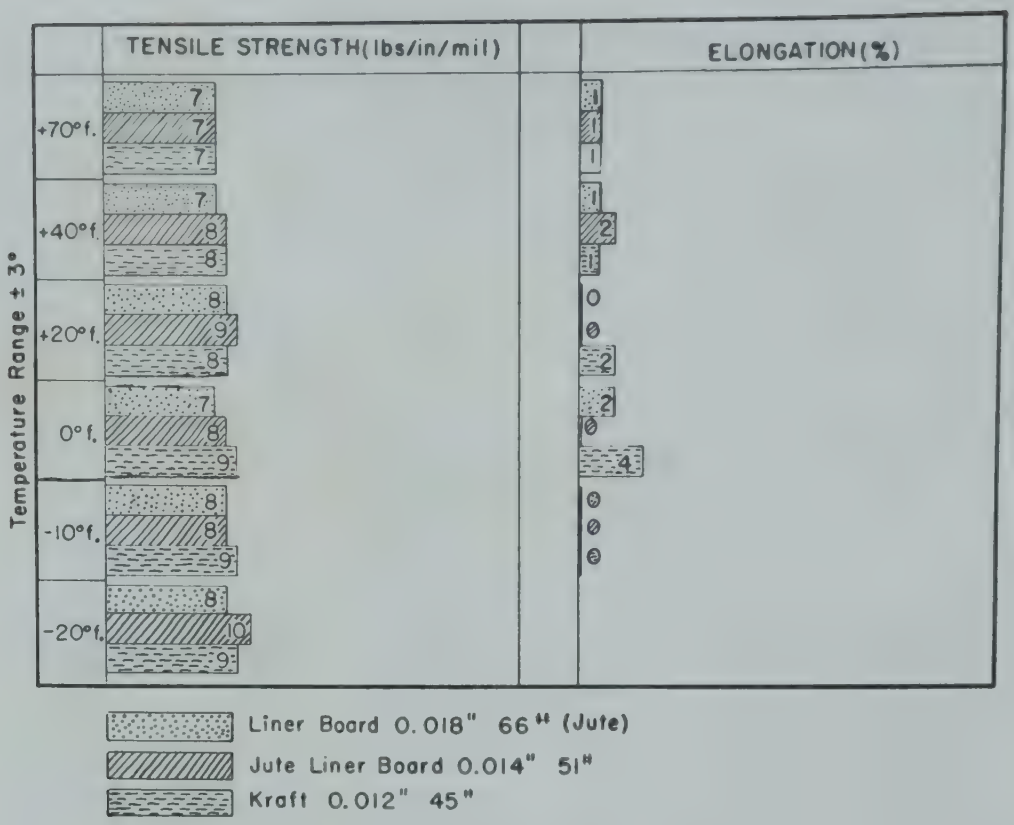

Fig. 19. Various liner boards and paper.

to the fact that this problem instructs us to work in temperatures minus 80° F., and that the present facilities at the Quartermaster Food and Container Institute at Chicago are not sufficient to carry on research investigations at such low temperatures. Although some progress has been made as the result of the direction and recommendations of the committee and because of the work done by the Quartermaster Food and Container Institute, it is my opinion that this important problem cannot be advanced until facilities of the necessary cold room type and instruments are made available.

The Quartermaster Food and Container Institute has been working closely with more than twelve manufacturers of adhesives and converters of packaging material to find an adhesive suitable for laminating packaging materials and sealing containers for use at sub-zero temperatures. To date, no adhesive has been found which is satisfactory even as low as minus 40° F.

One compound to be used as a Preservative for Kitchen and Bakery Utensils has been submitted by industry but was found unsuitable for use because it was too heavy and too tacky. The company which submitted the sample has agreed to work with the Quartermaster Food and Container Institute on this problem. Information has been received

that the Ordnance Department has a material which may be satisfactory but is awaiting approval of the Office of The Surgeon General from the standpoint of toxicity. To date, insufficient information has been supplied to enable the Quartermaster Food and Container Institute to evaluate this preservative.

A program for testing commercial five-pound and ten-pound paper packets of sugar packed in five-ply multiwall paper balers for overseas shipment is under way with the Paper Shipping Sack Manufacturers Association. The testing program will begin when the Association has completed arrangements for supplying materials to be tested and when the sugar is packed by a commercial packer.

A series of tests on six types of bags for overseas shipment of 94 pounds of High Early type cement have just been completed. The data are being analyzed and the report is being prepared at the present time. The Quartermaster Food and Container Institute, Department of the Navy, and Paper Shipping Sack Manufacturers cooperated in formulating these tests, with the Quartermaster Food and Container Institute conducting the testing program.

The following problems, being similar each to the other, have been combined into one group for convenience:

Waterproof case liner for clothing
Sealed waterproof case liner for leather products
Sealed waterproof case liner for soap
Sealed waterproof case liner for napthalene flakes

To expedite solution of these case liner problems, a committee composed of representatives of four manufacturers of waterproof papers was established in December 1949. The membership of this committee is:

Dr. M. L. Downs, Thilmany Pulp & Paper Company, Kaukauna, Wisconsin

Mr. Robert H. Wood, Simplex Paper Corporation, Adrian, Michigan

Mr. F. F. Newkirk, The Sisalkraft Company, American Reenforced Paper Company, Attleboro, Massachusetts

Mr. B. K. Clifford, Union Bag and Paper Corporation, Hudson Falls, New York

In January 1950, the committee held its first meeting at the Quartermaster Food and Container Institute. The problems were analyzed and the committee voted to submit a report to the technical committee of the Waterproof Paper Manufacturers Association with a recommendation that the report be circulated to the membership of the Association. Several matters were to be discussed with the technical committee of

the Waterproof Paper Manufacturers Association, and the Institute is to be informed of decisions reached.

A 50-pound sample of naphthalene flakes has been furnished to the research laboratories of one company for testing their own material as a possible solution to this problem.

A survey of available items for use as Containers for Napkins, Sanitary Tissues and Paper Towels and Toilet Tissue in Quartermaster Depots has revealed that the commercial pack of 100 rolls in a fiberboard carton will not withstand stacking or palletization for any length of time. These items are of necessity procured on a military requirement basis for a fiscal year and are stocked in various General Depots for subsequent issue to using destinations.

Figure 20 shows tissue stacked in a depot. Note the crushing and sagging that has occurred. *Figure 21* shows various types of pack considered. Pack A is the one used by industry during the war and one which was very satisfactory for handling, shipping and storage by the Quartermaster Corps. Contrast this with the present industry pack shown on the right (Pack D). The excess space which has developed in the pack after storage and handling has been filled in with strips of corrugated fiberboard at the bottom and the left of the illustration. This pack is completely unsuited to shipping, storage and handling by the Quartermaster Corps.

Packs B and C were developed by the Quartermaster Food and Container Institute and along with Pack A were proposed to the Tissue Association for use on Quartermaster Corps Contracts. The Association has refused to accept any variation from the standard pack (Pack D on the chart) for various reasons, among which was the fact that the Armed Services purchases at the present time are at most 3 per cent of total consumption. Toilet tissue purchased in 1949 aggregated 60,000 tons which is being packed in containers unsuitable for use. Pack A or B would be desirable.

Arrangements have been made to secure from one supplier, toilet tissue packed "64 count." When this merchandise arrives at the general depots, periodic surveys will be made to determine if this (Pack C) will withstand handling, storage, and subsequent shipment to using destinations.

The Tissue Association has expressed a willingness to discuss this problem further. It is recommended that the Associates, Quartermaster Food and Container Institute arrange for a meeting with the Tissue Association to determine if a pack which will more closely resemble Pack A can be obtained for peacetime use.

Paper napkins received from contractors in commercially packed

FIG. 20. Stacked toilet paper containers.

RESUME

STUDY CONDUCTED BY THE QMF & CI HAS SHOWN THAT THE TOILET TISSUE PACKS IN ORDER OF PREFERENCE ARE:

	PACK "A"	PACK "B"	PACK "C"	PACK "D"
GROSS WEIGHT APPROX LBS.	40	36	37	61
CUBIC FEET APPROX.	2.1	2.6	2.7	5.1
QUANTITY ROLLS	60	60	64	100

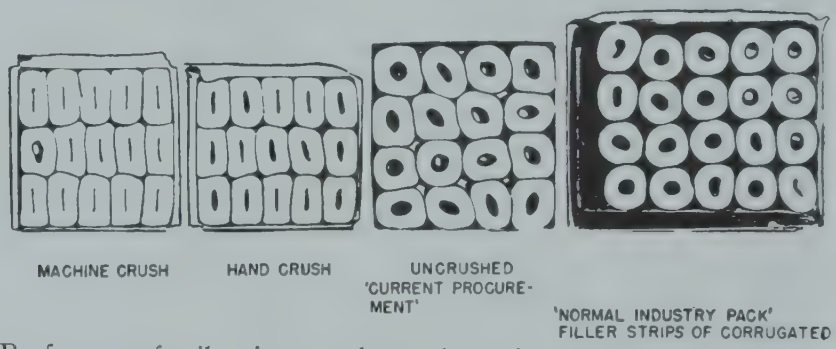

FIG. 21. Preference of toilet tissue packs as shown in study made by the QM Food and Container Institute for the Armed Forces.

corrugated containers are presenting a problem in handling and storage in Quartermaster Depots. The napkins are not tightly wrapped or packed and bending, sagging and crushing of the container occurs during shipment and subsequent storage of the containers.

When napkins are stored in a depot, sagging and buckling of containers result. Three corrugated containers designed by the Institute for compressed napkins are shown in *Figure 22*. The savings in weight and cube in comparison with the pack currently supplied by industry is shown. These designs will be referred to the napkin industry in an attempt to secure a suitable pack which can be supplied by the manufacturers.

JOHNSTON

Thank you, Mr. Croy, for an excellent report.

We will now hear the report on Rigid Containers: I am sorry that the chairman of that Committee, Mr. Graham, is not able to be here today so I will call on Mr. Robert Rinschler who is the Institute Coordinator. Mr. Rinschler!

Report of the Subcommittee on Rigid Containers

MR. RINSCHLER

In a great many instances, especially in overseas shipment, the

	QMF & CI COMPRESSED PACK "A"	QMF & CI COMPRESSED PACK "B"	INDUSTRY PACK
QUANTITY	10,000	12,000	10,000
NO. OF UNIT PKGS.	10	12	10
APPROXIMATE GROSS WEIGHT (LBS.)	59	72	60
APPROXIMATE CUBIC FEET	4.23	5.68	7.2

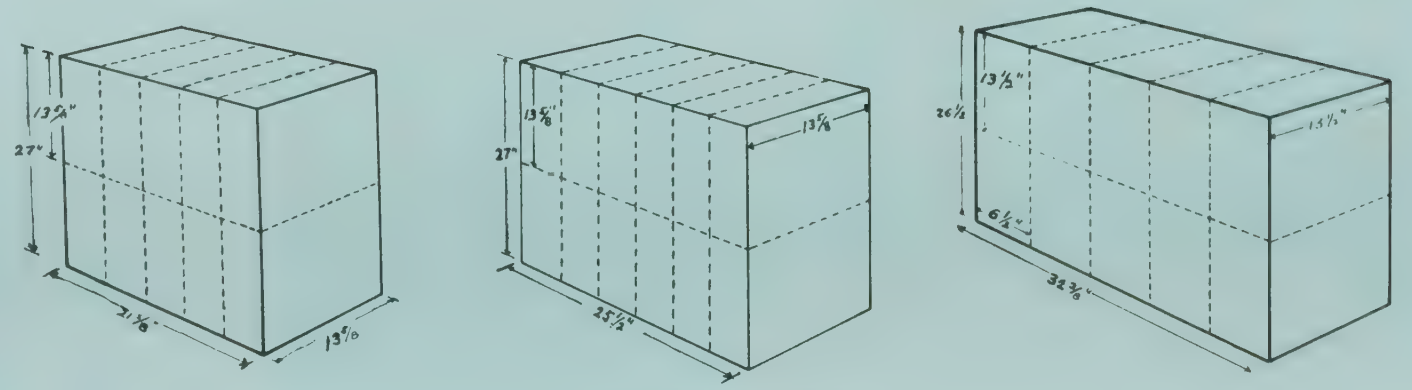

FIG. 22. Comparison of Napkin Packs.

multiple friction plug closures on standard multiple friction plug cans become disengaged in transit, spewing the contents throughout the exterior shipping container and adjacent cargo.

To eliminate this deficiency it is imperative to develop a more positive closure which will perform in the same manner as a round open-top hermetically sealed can. At present, multiple friction plug cans for overseas shipment of one-gallon capacity are being spot-soldered to the friction ring at three points equidistant from each other on the periphery of the plug. This method is not completely satisfactory for handling and shipping because plugs, in numerous cases, still become disengaged in transit. To overcome this deficiency, Industry has submitted to the Institute a standard multiple friction plug can which, after seating of the plug, has been indented at six equidistant points around the inside periphery of the plug closure. This method is still in the development stage but the closure has been so good that the plug cannot be disengaged without damaging or distorting the can. Work is continuing to determine the balanced medium for indenting of plug to ring.

Another type of can which has come to the attention of the Institute, consists of a body with a protruding shoulder, sealed by a snap-on, cap-type closure; it is fitted with a retaining ring type cover. This closure is a patented item and is currently used in packaging paints and related products.

Figure 23 illustrates the body, the cap closure and the sealing ring of this can.

This type of can and closure must be impact tested to determine its ability to withstand rough handling in storage and transit. Furthermore, since it is a patented feature, complete investigation concerning patent rights and license must be made prior to authorizing its use.

As these various closures have not proved to be entirely satisfactory for overseas shipment, the Quartermaster Food and Container Institute is highly interested in the improvement of the current standard multiple friction plug type can and its closure. *Figure 24* shows a comparative photograph of the three types of cans discussed.

Figure 25 illustrates another problem. It shows the tear tab and the scored top type of can for jam.

Figure 26 illustrates the tear tab can with the tab broken. You will note that a sharp instrument must be used to open the can. The tear tab can is constructed of one piece drawn body. The tear tab can has a compound lined lid held in place by an aluminum tear strip. The utility in the field has not been entitrely satisfactory due to high percentage of failure of the tear tabs. Furthermore, only one company can produce this particular can at the present time.

FIG. 23. Snap-on can disassembled.

FIG. 24. Three cans (spot-soldered, indented and snap-on).

Figure 27 indicates the scored top can being opened by a sharp instrument. The scored top can is a one piece drawn body, compound lined, double seamed top, with scored line for opening with sharp instrument. This container can be opened with folding can opener furnished in ration pack (C Ration). The utility in the field, however, is not entirely satisfactory.

Both types of cans are acceptable under the current specification. The problem of an improved type of jam container, particularly, the

FIG. 25. Jam Cans—tear tab opening and scored for opening.

FIG. 26. Jam Cans—opening tear tab can—(tab torn off).

FIG. 27. Jam Cans—opening scored can.

problem of providing a can easier to open, has been referred to the Can Manufacturers Institute. Only two companies have contacted the Container Laboratories and expressed a willingness to cooperate and resolve the problem. One has expressed an interest but to date no information or samples illustrating their design or development have been supplied to the Container Laboratories.

The problem of furnishing the Quartermaster Corps with cans for prepared mustard and salad dressing has been submitted to the Can Manufacturers Institute for study and recommendations.

The development of Test Procedures for Rough Handling and Cyclic Exposure has been referred to industry by Mr. Graham, Chairman of the Rigid Container group. Contacts have been made with Dr. Waring, Davidson Chemical Company, Shelmar Company, Reynolds Metal Company, and other producers and manufacturers of moisture-vaporproof, flexible barrier material. A tentative meeting is scheduled for 27 April in Chicago to plan the means of attack for correlating the rough handling and cyclic exposure tests which are indicated in the two specifications; namely JAN-P 116 and JAN-P 131.

It is to be noted that specification JAN-P-131 covers the test requirements for rough handling and cyclic exposure for performance standards of the barrier material. Specification JAN-P-116 covers the rough handling and cyclic exposure test for completed packs including the 131 barrier materials and exterior shipping containers. Since the two

tests in the respective specifications differ in methods of rough handling as well as temperatures and relative humidities, it is proposed to establish a rough handling and cyclic exposure test which will be comparable and usable in both specifications.

Certain corrosive chemicals and high strength vinegar, as well as stabilized cream, must of necessity be packed in glass bottles. Containers must be designed to eliminate or minimize as much as possible (a) breakage of glass bottles, (b) seepage to other cargo, if glass bottles are broken.

Figures 28 and 29 show examples of types of packs which have been used or are currently being used by the Quartermaster Corps.

These packs consist of a fiberboard container provided with inner liner and individual cell spacers in accordance with the requirements of consolidated freight classification. This type of pack is employed for standard commercial shipments within the zone of interior but insufficient protection to bottles within the container leads to breakage, as is shown in *Figure 29.*

Figure 30 shows a pack consisting of a fiberboard container provided with full height slotted partitions separating each bottle. The fiberboard container is overpacked in a nailed wood crate to afford greater resistance to shock and impact. Failure still occurs due to insufficient cushioning between bottles.

Figure 31 shows a pack consisting of two fiberboard containers provided with full-height slotted partitions separating each bottle and two fiberboard cartons overpacked in a nailed wood box to afford greater resistance to shock and impact. Failure still occurs due to insufficient cushioning between bottles even though intermediate pack was redesigned to contain half of the standard pack. Example: Standard pack is 24 pints to a container; two intermediate containers were used each containing 12 pints. The bottles are insufficiently protected and contents seep and contaminate other cargo.

Figure 32 shows a pack consisting of a fiberboard container provided with inner liner and individual cell spacers. The container is wrapped with waterproof barrier material and overpacked in a wooden shipping container. The wooden shipping container is approximately 4 inches larger than container in each direction. This space is filled with excelsior pads or other equivalent cushioning material providing a 2 inch cushion to all faces of the fiberboard container, which provides less breakage but at high cost and excessive cube.

Figure 33 shows each bottle slipped into a sleeve fabricated from cellulose wadding cushioning material. Wooden shipping container is lined with a minimum of 2 inches of a cushioning material. This pack

FIG. 28. Fiberboard Carton (1).

FIG. 29. Fiberboard carton (2).

Fig. 30. Carton—wood crate.

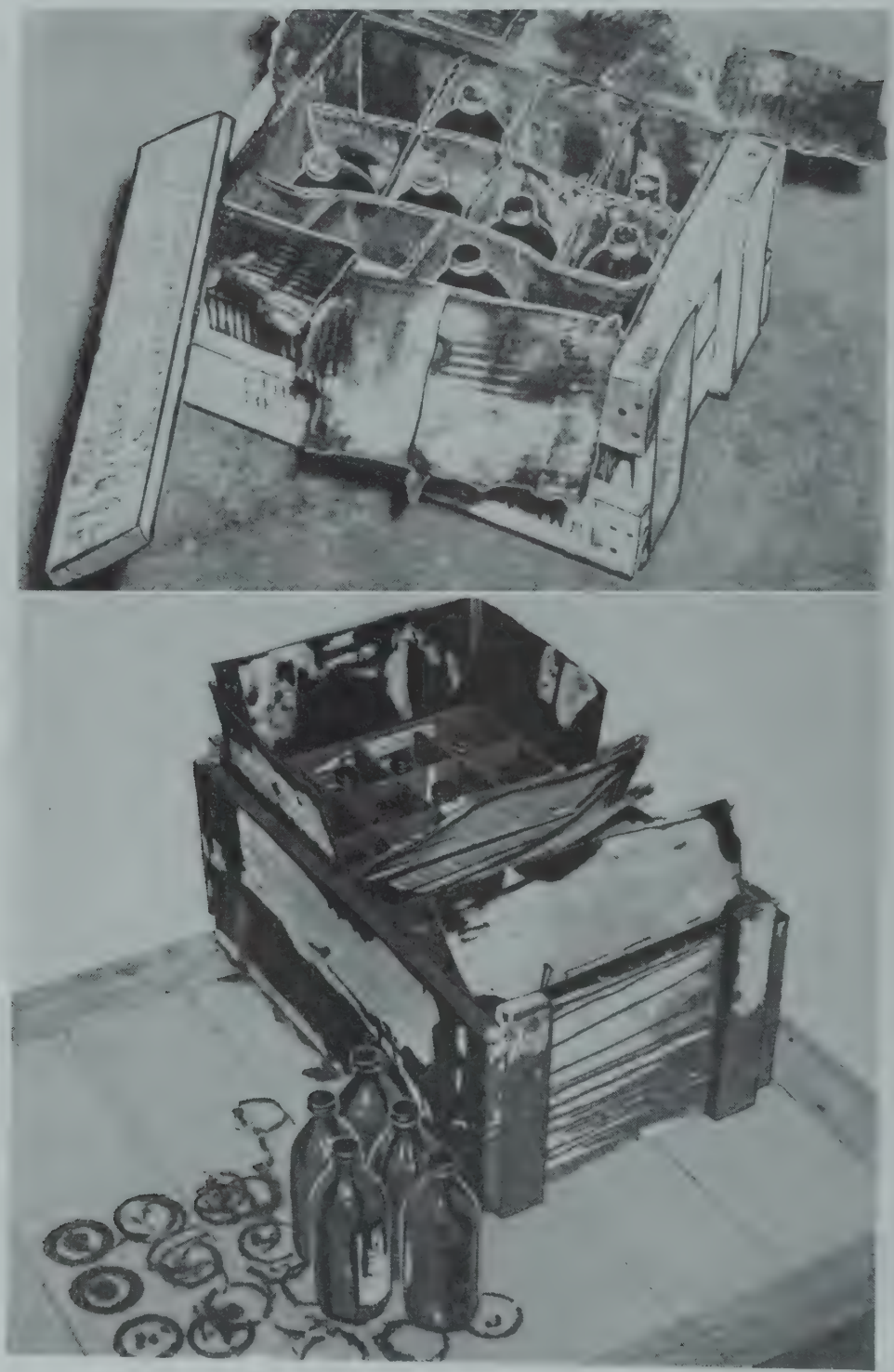

Fig. 31. Two cartons—wood box.

Fig. 32. Cellulose Wadding Pack.

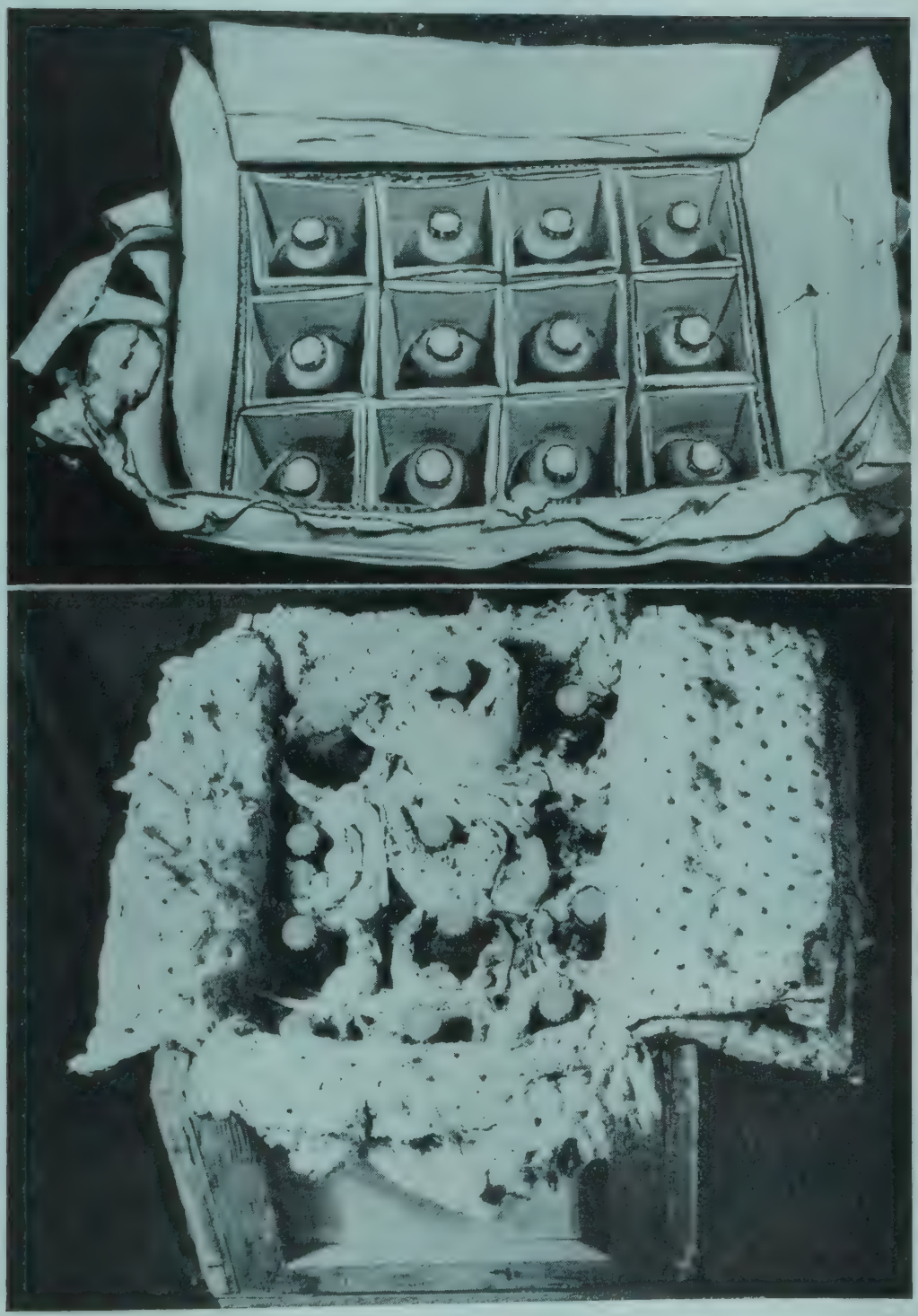

Fig. 33. Carton—Excelsior Pack—wood box.

assures less breakage and seepage but is expensive and space consuming.

As the result of coordinated effort of the Glass Manufacturer's Institute and the Quartermaster Food and Container Institute we are now in progress of designing a container to determine if referenced deficiencies can be eliminated or lessened percentagewise.

Figure 34 shows development of a new method of pack. Each bottle is slipped into a prefabricated cellulose wadding pocket sleeve of ¼ inch thickness. Sleeve is folded over top of bottle and sealed. Each

FIG. 34. Proposed Pack.

individually cushioned bottle is placed in compartment formed by individual cell spacers. The container and inner packing are fabricated of water resistant material. This particular development is an attempt to decrease the over-all cube and still provide adequate protection between bottles.

The packs illustrated in *Figure 28* (the standard commercial pack) are approximately 1.3 cubic feet. The pack illustrated in *Figure 33* (fibreboard container overpacked in nailed wood container with 2 inch cushioning material over all faces) is approximately 2.6 cubic feet.

The proposed method, *Figure 34*, will decrease the weight and establish a cube somewhere between the low and high levels. The pack, if it

is found adequate, after thorough testing, will be the guidepost for future developments of glass container packs for use by the Armed Forces.

Upon comparing the different types of containers illustrated, it is found that a container which will overcome the following deficiencies has not been developed:

a) Maximum product protection.
b) Elimination of seepage, if bottles are broken.
c) Lower cost of container in relationship to cost of product.
d) Reduction in weight and cube.

The Quartermaster Food and Container Institute proposes that industry assist in the development of containers to overcome the deficiencies as illustrated and outlined in a, b, c, and d above.

Appendix

ANIMAL PRODUCTS PROBLEMS

Canned Meats (A)

PROBLEM. Modification of presently available canned meat items to eliminate canned meat flavor and texture. Storage life requirements are at least 6 months at 100° F.

Canned Meats (B)

PROBLEM. Development of acceptable canned meat items with a storage life of at least 6 months at 100° F.

Canned Sterile Ham

PROBLEM. Development of an acceptable sterile canned ham with a storage life of 6 months at 100° F.

Mild-Flavored Ham and Bacon

PROBLEM. Provision of highly acceptable mild-flavored ham and bacon with storage life of 1 year at 70° F.

Dehydrated Meats

PROBLEM. Development of palatable dehydrated precooked meat products with storage life of at least 6 months at 100° F.

Canned Bacon

PROBLEM. Production of an acceptable canned bacon with storage life of at least 6 months at 100° F.

Maximum Temperature Registering Indicator for Frozen Meats

PROBLEM. Development of a device for indicating exposure of frozen meats to deleterious temperatures.

Prefabricated Frozen Turkey

PROBLEM. Provision of highly acceptable frozen ready-to-use consumer cuts of turkey, utilizing the entire carcass.

Frozen Lamb

PROBLEM. Provision of highly acceptable frozen ready-to-use consumer cuts of lamb, utilizing the entire carcass.

Frozen Pork

PROBLEM. Provision of highly acceptable ready-to-use frozen pork chops, loin roast, and pork sausage with storage life of 1 year at 0° F.

Dehydrated Eggs

PROBLEM. Improvement of dehydrated whole egg powder to obtain optimum acceptability after storage for 1 year at 100° F.

Canned Sea Food Products

PROBLEM. Development of acceptable canned sea food products with storage life of at least 6 months at 100° F.

CEREAL AND BAKED PRODUCTS PROBLEMS

Canned Baked Products

PROBLEM. Development of methods for inhibiting or retarding rust formation in canned baked products.

High Carbohydrate Food Product

PROBLEM. Development of a low moisture (6-8%) high carbohydrate food for specialized survival rations. The food must (a) be non-thirst-provoking, (b) be non-irritating to the membranes of the mouth, (c) not increase the water requirements for physiological functions, and (d) have a storage life of at least 6 months at 100° F.

Premixed Cereals

PROBLEM. Development of new and improved premixed cereals which have a storage life of at least 6 months at 100° F. specifying formulas, quality of ingredients, and general methods of manufacture.

Canned Bread (Development)

PROBLEM. Development of canned bread with the acceptability of "bakery-fresh" bread after storage for 6 months at 100° F.

Foil-Wrapped Bread

PROBLEM. Improvement of the acceptability of foil-wrapped bread after storage for 3 months at 100° F.

Dehydrated Soups

PROBLEM. Development of acceptable egg noodles and rice products which will be instantly reconstitutable in boiling water.

Cake Mixes

PROBLEM. Development of cake mixes requiring only the addition of water prior to mixing and having a minimum storage life of 6 months at 100° F.

Canned Cakes

PROBLEM. Preparation of canned pound cake, date-nut roll, and chocolate-nut roll with a minimum storage life of 6 months at 100° F.

Canned Puddings

PROBLEM. Development of new and improved canned pudding products, specifying formulas, quality of ingredients, and general methods of manufacture.

Baking Powder

PROBLEM. Definition, for specification purposes, of baking powders with storage life of 6 months at 100° F.

Whole Wheat Flour

PROBLEM. Development of a wheat concentrate with a storage life of 6 months at 100° F.

Soya Products

PROBLEM. Standardization of test methods for protein solubility in soya products.

Dehydrated Molasses

PROBLEM. Provision of a non-hygroscopic molasses powder for use in gingerbread cake mixes.

Canned Raisin Bread

PROBLEM. To provide a canned raisin bread which will not discolor in the areas adjacent to the raisins and which will have a storage life of at least 6 months at 100° F.

Canned Whole Wheat Bread

PROBLEM. Provision of a palatable canned whole wheat bread with a minimum storage life of 6 months at 100° F.

DAIRY, OIL AND FAT PRODUCTS PROBLEMS

Dry Whole Milk (A)

PROBLEM. Provision of a product which, after storage for 6 months at 100° F., will reliquefy readily with manual stirring and will more closely simulate fresh fluid milk in appearance and palatability.

Dry Whole Milk (B)

PROBLEM. Provision of additional specification tests, supplementing the standard grading procedure, which will permit selection of currently available products with the greatest acceptability and longest storage life.

Dehydrated Spreads for Bread

PROBLEM. Provision of a spread for bread that has a storage life of at least 6 months at 100° F., will not separate on freezing, can be consumed as produced or is readily reconstituted, and is comparable in acceptability to butter scoring 92-93 at time of tasting.

Canned Margarine

PROBLEM. Development of palatable canned margarine with a storage life of at least 6 months at 90° F. and emulsion stability at —40° F.

Sterile Beverage Milk

PROBLEM. Development of palatable, flavored or unflavored, sterilized milk with a storage life of at least 6 months at 100° F. and unaffected by freezing temperatures.

Nonfat Dry Milk Solids

PROBLEM. Provision of specification tests for nonfat dry milk solids intended for beverage use to determine extent of heating during processing.

Army Spread

PROBLEM. Provision of analytical and sanitary control procedures for Army Spread to eliminate possibilities for bacteriological spoilage.

Milk Fat

PROBLEM. Development of a milk fat which will have a storage life of two years at 70° F.

Antioxidants

PROBLEM. Provision of antioxidants for fat which will extend the storage life of food products containing fat as an ingredient.

Canned Sterile Cream

PROBLEM. Development of a canned sterilized 30% cream which will have a storage life of not less than 6 months at 100° F.

Edible Oils and Shortenings

PROBLEM. Development and evaluation of a photoelectric method for the color grading of edible oils and shortenings.

Shortening

PROBLEM. To enlarge the specification for shortening products to permit the utilization of suitable oil ingredients other than cottonseed and peanut oils.

Dry Cream

PROBLEM. Development of a palatable dry cream that will disperse readily in hot coffee and tea and have a storage life of 6 months at 100° F.

Frozen Milk

PROBLEM. Development of frozen milk which will not separate when transported or stored at 20° F.

Canned Butter

PROBLEM. Provision of a palatable canned butter with a shelf life of at least 6 months at 90° F. and emulsion stability at —40° F.

Evaporated Milk

PROBLEM. Development of an evaporated milk which does not require turning in storage.

Dry Salad Dressing Mix

PROBLEM. Development of a dry salad dressing mix, readily reliquefied to produce a palatable salad dressing after storage for 6 months at 100° F.

Salad Dressing

PROBLEM. Development of a salad dressing having a storage life of 6 months at 100° F. and suitable for use after freezing and thawing.

FRUIT AND VEGETABLE PRODUCTS PROBLEMS

Dehydrated Soups

PROBLEM. Provision of dehydrated precooked pea, bean, onion, potato, and tomato soups meeting the following requirements:

a. Capable of rehydration by the addition of water heated to the temperature range of 100° to 212° F., and stirring one minute or less.
b. Having flavor, color, aroma, and texture comparable to those of soups prepared from fresh ingredients by conventional cooking procedure.
c. Possessing storage life of at least 6 months at 100° F.

Dehydrated Precooked Mashed Potatoes

PROBLEM. Provision of dehydrated precooked, mashed potatoes meeting the following requirements:

a. Capable of rehydrating to a mashed potato by the addition of water heated to the temperature range of 100° to 212° F., and stirring or whipping for a total mixing time of not more than two minutes.
b. Having, after rehydration, flavor, color, aroma, and texture comparable to a product prepared from fresh potatoes by conventional cooking methods.
c. Furnishing the highest possible number of calories compatible with requirements a, b, and d.
d. Having a storage life of at least six months at 100° F.

Canned Soups (Ready-to-Serve and Condensed)

PROBLEM. Information is needed on which to base improved specifications for canned Tomato, Vegetable-Beef, Cream of Mushroom, Cream of Pea and Chicken-Noodle soups.

Fruit Bar

PROBLEM. Provision of additional palatable forms of fruit bars possessing the following requirements:

a. Suitable for consumption at temperatures as low as —70° F.
b. Posessing at least 6 months' storage life at 100° F.

Dehydrated Orange Juice

PROBLEM. Provision of a dehydrated orange juice meeting the following requirements:

a. Capable of rehydration within 3 minutes by stirring with cold water.
b. Having, after rehydration, flavor, color, and aroma of freshly expressed juice.
c. Possessing storage life of not less than 6 months at 100° F.

Dehydrated Vegetables

a — WHITE POTATOES
b — SWEET POTATOES
c — ONIONS
d — CABBAGE
e — BEETS
f — CARROTS
g — CORN
h — PEAS
i — CELERY
j — GREEN BEANS

PROBLEM. Provision of the listed dehydrated vegetables meeting the following requirements:

a. Capable of rehydration by simple cooking procedures involving cooking times not exceeding those required for preparation of the fresh products.
b. Have flavor, color, texture, and aroma, when rehydrated, which are comparable to products prepared from fresh materials.
c. Possess a storage life of 6 months at 100° F.

Dehydrated Fruits

a — APPLES
b — APRICOTS
c — PEACHES
d — PEARS
e — CRANBERRIES
f — PINEAPPLE
g — CHERRIES
h — STRAWBERRIES
i — RASPBERRIES

PROBLEM. Provision of dehydrated fruits meeting the following requirements:

a. Capable of rehydration in 30 minutes by simple procedures.
b. Possessing, in the rehydrated forms, texture, flavor, and aroma comparable to similar items prepared directly from the fresh product.
c. Suitable for consumption in the dehydrated form.
d. Possessing a storage life of at least 6 months at 100° F.

Food Fumigants

PROBLEM. Determination of whether the actions of ethylene oxide, propylene oxide, and ethyl formate on food constituents create toxic residues in fumigated foods and thereby render them objectionable for human consumption.

GENERAL PRODUCTS PROBLEMS

Soluble Coffee

PROBLEM. Provision of a pure soluble coffee or soluble coffee product which, on reconstitution, resembles freshly brewed coffee in aroma and flavor, and which is stable for at least 6 months at 100° F.

Candy Bars

PROBLEM. Development of candy bars that will retain original flavor and texture characteristics for 6 months at 100° F., and will be usable at temperatures varying from —70° F. to more than 100° F.

Stable Coatings for Candy Bars

PROBLEM. Development of candy bar coatings made from chocolate or other materials that will remain stable for 6 months at 100° F. and will be usable at temperatures varying from —70° F. to over 100° F.

Imitation Black Pepper

PROBLEM. (1) Development of an imitation black pepper which will be independent of the pure spice or its derivatives and which will consist entirely of domestic products. (2) Development of an imitation black pepper which in part may consist of genuine black pepper or its derivatives.

The products must approximate the pungency, aroma, and flavor of genuine black pepper and must have a storage life of at least 6 months at 100° F.

Soluble Tea

PROBLEM. Provision of a pure soluble tea or soluble tea product which, on reconstitution, resembles freshly brewed tea in aroma and flavor, and which is stable for at least 6 months at 100° F.

Sauces

PROBLEM. Requirements for specification purposes of analytical procedures which may be used in the evaluation of the quality of Worcestershire, chili, and soy sauces.

Sirup

PROBLEM. Definition of refiners' sirup to insure high quality of blended sirups containing refiners' sirups.

"Bloom" on Chocolate Products

PROBLEM. Prevention of the "bloom" (gray color) which appears on chocolate.

Protein Hydrolysates

PROBLEM. Definition, for specification purposes, of the detailed chemical and physical requirements of protein hydrolysates from various sources for use in soup and gravy bases and similar products.

Manufacturers' Salt

PROBLEM. Definition, for specification purposes, of the detailed chemical and physical requirements of salt used for various manufacturing purposes.

Peanut Butter

PROBLEM. Improvement and fortification of peanut butter as a spread to supplement jams and jellies in military rations.

Stability of Nuts in Candy

PROBLEM. Improvement of the stability of peanuts and other nuts when incorporated in candy bars.

Mincemeat

PROBLEM. Development of test methods and a minimum formula for specification purposes.

Stability of Essential Oils

PROBLEM. Improvement of the stability of essential oils by the use of antioxidants.

Coconut

PROBLEM. Standardization of the types of prepared coconut for specification purposes.

Liquid Sugar

PROBLEM. Definition, for specification purposes, of the detailed chemical and physical requirements of liquid sugar used in various manufacturing processes.

Soluble Spices

PROBLEM. Evaluation of soluble spices in terms of pure spice equivalents and chemical analytical methods.

FLEXIBLE PACKAGING PROBLEMS

Test Method for Evaluating Containers

PROBLEM. Development of new testing procedures and/or modification of existing testing procedures for determining the suitability of containers for shipment, storage, and handling at temperatures as low as —80° F.

Adhesives

PROBLEM. Development of an adhesive for the sealing of containers, container materials and case-liners which will perform satisfactorily when encountering rough handling in the temperature range of —80° to +160° F.

Preservative for Kitchen and Bakery Utensils

PROBLEM. Development of a non-toxic, tasteless, odorless, and colorless preservative oil or compound to be applied to kitchen, bakery, and eating utensils and units to prevent corrosion.

Testing of Paper and Textile Bags for Domestic and Overseas Shipments

PROBLEM. Development of standards of performance of paper and textile shipping sacks for both domestic and overseas shipment; and modification of types and styles of sack construction which will be suitable for use by the Armed Services to avoid either overpackaging and packing (entailing economic loss), or underpackaging and packing (resulting in excessive damage.)

Waterproof Case Liner for Clothing

PROBLEM. Development of a waterproof case liner for clothing which will withstand rough handling and exposure to temperatures ranging from —80° F. to +160° F. and R. H. of 30% to 95%.

Sealed Waterproof Case Liner for Leather Products

PROBLEM. Development of a waterproof case liner which will permit the leather products to breathe, thereby preventing mold and degradation of the packaged contents. The case liner must be capable of being sealed to withstand rough handling and cyclic exposure tests at temperatures ranging from —80° F. to +160° F. and R. H. of 30% to 95%.

Sealed Waterproof Case Liner for Soap

PROBLEM. Development of a sealed waterproof case liner for soap (having a moisture content of 15% or greater) which will permit evaporation but prevent water absorption.

Containers for Napkins, Sanitary Tissues and Paper Towels

PROBLEM. Development of an initial 40-pound pack suitable for storing lightweight paper products in palletized form at military depots in order that repacking for subsequent shipments may be avoided.

Sealed Waterproof Case Liner for Naphthalene Flakes

PROBLEM. Development of a sealed waterproof case liner or barrel liner to preserve naphthalene flakes during shipment and storage at temperatures ranging from 0° F. to +160° F.

RIGID CONTAINER PROBLEMS

Test Procedures for Rough Handling and Cyclic Exposure

PROBLEM. Revision of rough-handling, quick-leak, and cyclic-exposure tests for Joint Army-Navy Specification JAN-P-116, "Packaging and Packing for Overseas Shipment, Preservation, Methods Of" and Joint Army-Navy Specification JAN-P-131, "Barrier-Material, Moisture-Vaporproof, Flexible."

Packing of Glass Containers

PROBLEM. Development of an efficient method of packing glass containers to prevent breakage in the course of domestic and overseas shipment.

Friction Plug Can Closure

PROBLEM. Development of (1) a tear strip closure similar to the key opening band, reclosure feature can, (2) a reclosure feature for multiple friction plug cans.

Container for Jam

PROBLEM. Development of a satisfactory container to contain one and one-half ounces of jam for use in operational rations.

Cans for Prepared Mustard

PROBLEM. Development of a specification for a can which will provide adequate protection for prepared mustard for Armed Forces use.

Salad Dressing Can

PROBLEM. Development of a container, other than glass, for salad dressing. Container should resist deterioration for 6 months at 100° F. and 2 years at 70° F. when filled with salad dressing.

Cans for Pickles

PROBLEM. Development of a suitable metal container for sweet and dill pickles which will resist deterioration for 6 months at 100° F. and 2 years at 70° F.